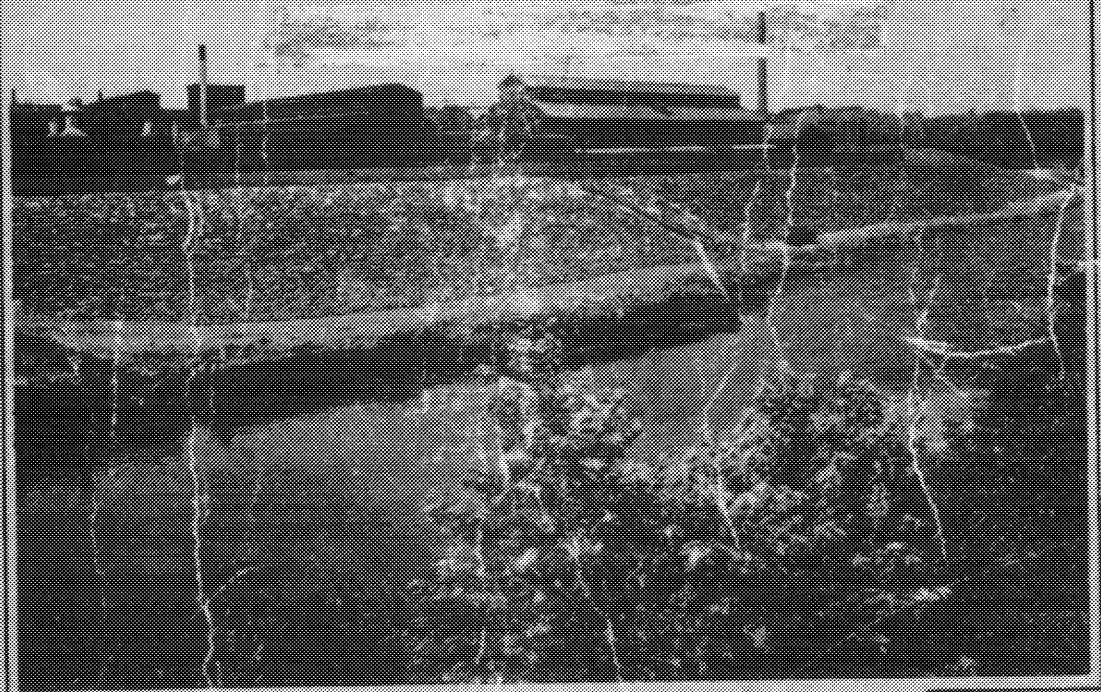
CONNECTICUT RIVER FLOOD CONTROL

OPERATION AND MAINTENANCE MANUAL

FOR

FLOOD PROTECTION SYSTEM

CHICOPEE, MASS.



FLOOD WALL — CHICOPEE, MASS.

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, WAR DEPARTMENT
BOSTON, MASSACHUSETTS
AUGUST 1947

OPERATION AND MAINTENANCE MANUAL

FOR

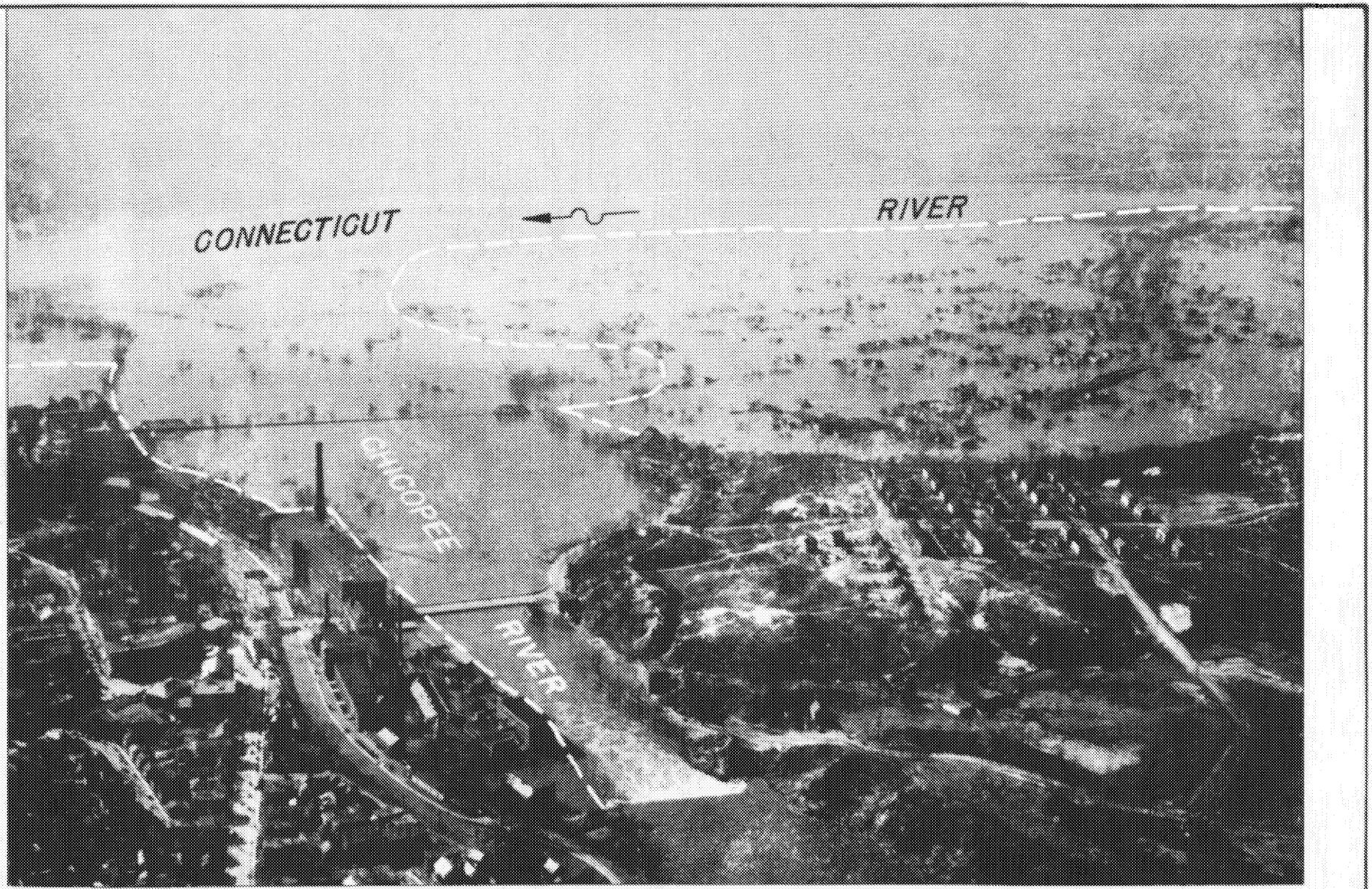
FLOOD PROTECTION SYSTEM

AT

CHICOPEE, MASSACHUSETTS

U. S. ENGINEER OFFICE BOSTON, MASS.

August 1947



CHICOPEE, MASS – MARCH 20, 1936
Dashed lines indicate flood protection system

OPERATION AND MAINTENANCE MANUAL

FLOOD PROTECTION SYSTEM

CHICOPEE, MASSACHUSETTS

FOREWORD

The more construction of an adequate system of dikes, walls, gates, and pumping plants is not permanent security against floods. To have complete assurance against floods it is necessary that the system, after being constructed, be carefully maintained at all times and be properly operated during flood periods. The necessity for proper maintenance is imperative in view of the fact that extensive damage or even the loss of life may be incurred through failure of a critical element of the system at flood time, caused by deterioration or damage that could have been avoided by proper maintenance. Faulty operation at flood time can cause considerable damage and may nullify the functioning of the entire protective system. Proper maintenance and correct operation of the flood protection system require that responsible local persons have a thorough understanding of the functions of the various units of the system. Maintenance and operation shall be provided in strict accordance with the regulations prescribed by the Secretary of War and as amplified by this Manual.

OPERATION AND MAINTENANCE MANUAL

FLOOD PROTECTION SYSTEM

CHICOPEE, MASSACHUSETTS

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SECTION I

INTRODUCTION

1-01. AUTHORIZATION. - The flood protection for the City of Chicopee was authorized by the Flood Control Act of June 28, 1938 (Public No. 761, 75th Congress) except that by the authority of the Emergency Relief Appropriation Act of June 22, 1936 a concrete flood wall approximately 500 feet long was built west of the Springfield Rendering Company as part of a dike project that extended from the North End bridge in Springfield, Massachusetts, to high ground in Chicopee, Massachusetts. The earth dike was later replaced by concrete flood walls and the wall opposite the Rendering Company was incorporated as a unit in the new wall.

1-02. LOCATION. - The project is located in the City of Chicopee, Hampden County, Massachusetts, on the east bank of the Connecticut River from approximately River Mile 79 to River Mile 84 and extends up the Chicopee River to high ground, which is approximately one mile above the confluence of the Chicopee and Connecticut Rivers.

1-03. DATES OF CONSTRUCTION. - Construction dates of the various sections were as follows: The section of wall west of the Springfield Rendering Company and the river bank protection from Station 80-00, northward to high ground, was started October 24, 1936 and completed June 10, 1937; the initial fiscal year 1939 unit of the Chicopee Dike along the Connecticut River was started December 16, 1938 and completed June 24, 1939; the fiscal year 1939 unit was started April 13, 1939 and completed May 24, 1940; the section of wall from the Chicopee-Springfield town line to high ground was started July 25, 1939 and completed December 16, 1939; the fiscal year 1940 unit was started February 26, 1940 and completed August 31, 1940; the dike, south bank Chicopee River and Dwight Pumping Station was started September 11, 1940 and completed December 17, 1941; the Plainfield Pumping Station was started February 12, 1940 and completed September 2, 1940; the Bertha Avenue Pumping Station was started August 1, 1940 and completed September 8, 1941; the Paderewski Pumping Station was started August 14, 1940 and completed September 3, 1941; the Jones Ferry Pumping Station was started July 18, 1940 and completed February 17, 1942; the Call Street Pumping Station was started September 16, 1940 and completed July 8, 1941.

1-04. GENERAL DESCRIPTION. - The flood protection system consists of approximately 22,200 lineal feet of earth dike; 6,100 lineal feet of concrete flood wall; 6 pumping stations, and appurtenant drainage features to supplement the City system of disposal of interior drainage. See Plates VII to LV of Appendix "D" for plans, profiles and typical sections of the system.

1-05. PROTECTION PROVIDED. - The dikes and walls are designed to protect against a design flood, greater than any of record, reduced by the approved plan of twenty reservoirs. Only three of the twenty reservoirs have been built. The dike and wall grades are, at all points, equal to or above the maximum state of the greatest flood of record, that of March 1936. Proposed protective works in the Willimansett Section from Charbonneau Terrace northerly have been deferred due to the City's failure to furnish right of entry.

The section of wall built in Chicopee, from the Chicopee-Springfield town line north to high ground, protects portions of both cities. Operation and maintenance of this section of protection works is primarily the responsibility of the City of Chicopee; however, the cities of Springfield and Chicopee should cooperate during flood periods in order to coordinate their activities to the best interest of both cities.

1-06. LOCATION MAP. - See Plate VII of Appendix "D" for location map.

SECTION II

LOCAL COOPERATION REQUIREMENTS

2-01. FLOOD CONTROL ACTS. - Section 3 of the Flood Control Act of June 22, 1936 (Public No. 738, 74th Congress) states:

> "That hereafter no money appropriated under authority of this Act shall be expended on the construction of any project until States, political subdivisions thereof, or other responsible local agencies have given assurances satisfactory to the Secretary of War that they will (a) provide without cost to the United States, all lands, easements, and rights-of-way necessary for the construction of the project, except as otherwise provided herein; (b) hold and save the United States free from damages due to the construction works; (c) maintain and operate all the works, after completion, in accordance with regulations prescribed by the Secretary of War."

The Flood Control Act of June 28, 1938 (Public No. 761, 75th Congress), which authorized the local protection works for Chicopee, Massachusetts, states that the provisions of (a), (b), and (c) of Section 3 of the June 22, 1936 Act would still apply.

2-02. ASSURANCE OF LOCAL COOPERATION. - The following assurances were furnished by the City of Chicopee:

a. For the section of the system built adjacent to the Springfield Rendering Company, the City of Chicopee executed an assurance on September 24, 1936 and it was approved by the Secretary of War on October 10, 1936, E.D. 7402 (Conn. R.) 130.

b. For all other sections of the system the City of Chicopee executed an assurance on November 2, 1938 and it was approved by the Secretary of War on November 10, 1938, E.D. 7402 (Chicopee River, Mass.) 12.

Copies of the assurances are included in Appendix "B" of this Manual.

SECTION III

GENERAL REGULATIONS

3-01. PURPOSE OF THIS MANUAL. - The purpose of this manual is to present detailed information to be used as a guide to complying with "Flood Control Regulations - Maintenance and Operation of Flood Control Works" as approved by the Acting Secretary of War on August 9, 1944, and published in the Federal Register on August 17, 1944, a copy of which is bound in the back of this volume as Appendix "A". In executing assurances of local cooperation for the Chicopee project, the City has agreed to maintain and operate the completed works in accordance with those Regulations. The Regulations are intended to cover all local protection projects constructed by the Department throughout the United States, are general in nature, and obviously cannot give detailed instructions for the maintenance and operation of a specific project. The details set forth in this manual for maintenance and operation of the Chicopee project are intended to supplement the Regulations to permit obtaining all the benefits and protection against floods for which the project was designed. Failure to maintain and operate the project as required by the Regulations and as detailed herein can cause severe property losses and loss of life and can result in an irreparable loss of confidence in the flood protection system by citizens who have invested their funds on the basis of the protection which it provides.

3-02. GENERAL RULES AND REGULATIONS. - a. The general rules of the regulations prescribed by the Secretary of War are in quotation marks below and are defined further by remarks under each quotation.

(1) "The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits."

(a) These requirements cannot be overstressed and the City authorities must make adequate provisions for funds, personnel, equipment, and materials to allow for the proper maintenance and operation of the flood protection works.

(2) "The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with regulations prescribed by the Secretary of War, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the "Superintendant," who shall be responsible for the development and maintenance of, and directly in

charge of, an organization responsible for the efficie operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during periods of low water, all without cost to the United States."

(a) The committee should be composed of competent members, preferably men experienced in engineering or construction work of a nature similar to the flood protection works. The committee must be given broad authority to carry out its responsibilities.

(3) "A reserve supply of materials needed during a flood emergency shall be kept on hand at all times."

(a) Materials such as sand bags, lumber, nails, rope, cinders, etc., and tools such as picks, shovels, hammers, saws, crowbars, etc., should be obtained and held in reserve to meet any ordinary emergency that may occur during flood periods. Borrow pits for embankment materials should be secured and sources of where to obtain additional supplies of materials, tools and equipment should be well established in order that these articles can be obtained quickly in case of an emergency.

(4) "No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the rights-of-way for the protective facilities."

(a) The grazing of cattle, disposal of rubbish, erection of fences, or barriers, wearing of foot paths or any form of trespassing on the project must be prohibited.

(5) "No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District Engineer of the War Department or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work."

(a) Any contemplated improvements or alterations as outlined above must be submitted to the Corps of Engineers, Boston, Mass., and the approval of the Division Engineer obtained prior to the City authorizing the work. All requests for approval shall be in writing and complete drawings, in duplicate, one set of which shall be in reproducible form, must be submitted along with a full description of the work intended. The City will be held responsible for obtaining prior approval from the U. S. Engineer Office, of any improvements or alterations proposed by themselves, private parties or any public parties. The City shall furnish the Division Engineer as-built drawings, in duplicate, of the completed work.

(6) "It shall be the duty of the superintendent to submit a semi-annual report to the District Engineer covering inspection, maintenance, and operation of the protective works."

(a) See paragraph 3-05 of this manual for instructions on submitting reports.

(7) "The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works."

(a) The Division Engineer or his representatives will make periodic inspections of the protective works to determine if the project is being properly maintained and operated by the City.

(8) "Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made."

(a) The City should maintain the facilities and keep them in good repair and not wait for the Division Engineer to call such matters to their attention. The Division Office will advise the City how to make any major repairs to the facilities.

(9) "Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods."

(a) The City should formulate plans and negotiate agreements with local organizations and companies, who are operating facilities connected with the protection works, to insure that their activities will be properly coordinated with the Superintendent's organization during flood periods.

(10) "The War Department will furnish local interests with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in carrying out their obligations under these regulations."

(a) The flood control committee should familiarize themselves with the contents of the manual. The superintendent should conduct classes to instruct his subordinates in the proper maintenance and operation of the flood protection facilities as outlined in the manual. The City authorities are encouraged to call on the U. S. Engineer District Office for any additional advice or instructions required by them in carrying out the City's obligations for maintaining and operating the flood protection facilities.

3-03. MAINTENANCE. - a. The word "maintenance", as used in this manual, applies to the upkeep, repair, and care of the work constructed by the War Department and turned over to the City.

b. Proper maintenance is essential and must be rigidly enforced if the flood protection facilities are to function properly during flood periods. The salient points of maintenance are:

(1) The Superintendent must have an organization competent to perform the work.

(2) Responsible members of the organization must be familiar with every inch of the project.

(3) The component parts of the facilities and their function must be understood by the responsible members of the organization in order to maintain the facilities up to the standards of the original construction.

(4) Repairs to any of the project works shall be made with like or similar materials.

(5) Encroachments on, and abuse of the facilities must not be allowed.

(6) Install stop-logs and test gates, valves, etc., at stated intervals to discover difficulties, unworkable parts, and shortages that may affect the operation of the facilities at flood periods.

(7) Make regular inspections of all of the facilities in a thorough manner by actually walking the system and carefully looking for any signs of deterioration, need of repair or upkeep, making notes of the features that require attention; take necessary action to have the faults remedied and re-inspect the work to see if it is done to satisfactory standards.

c. Further instructions regarding maintanance of the major features of the work are described in other sections of this manual.

3-04. OPERATION. - a. The word "operation" in this manual applies to the manipulation and use of all the various features of the protective facilities during flood periods of the river.

b. Efficient operation demands that the Superintendent and responsible members of his organization be familiar with every feature of the flood protection facilities and know when and how to take action to insure correct operation. The salient points of operation are:

(1) Know where stop-log structures, valves, and gates are located and when to close them.

(2) Know when to start pumping stations.

(3) Know where to look for possible signs of weakness or other indications or conditions which might endanger the proper functioning of the system.

(4) Have available adequate materials, equipment and labor to meet all contingencies.

(5) Know how, and take prompt action, to control any condition which endangers the facilities.

(6) Know how to get to every point of the works, even though it is dark and the customarily used routes are blocked.

(7) Make arrangements with the United States Weather Bureau Office, Brainard Field, Hartford, Connecticut (telephone No. Hartford 2-8116), to keep the City informed on flood predictions. The Weather Bureau Office at Hartford is the official agency for collecting precipitation data and the preparation of flood forecasts and is responsible for issuance of flood warnings. It receives, during impending flood periods, telephoned reports of precipitation and runoff every six hours from selected points in the Connecticut River Basin. From these data Connecticut River stage forecasts for critical locations between White River Junction, Vermont and Hartford, Connecticut are prepared.

(8) Know the municipal and local businessmen who are to assist in the flood fight. It will be to the City's advantage to negotiate agreements with private owners and companies to operate and maintain project features that are directly related to facilities and property of those parties. The City must remember, however, that the U. S. Engineer Department will look only to the City for maintenance and operation of the project since that is the body which executed assurances of local cooperation.

c. The detailed operation of the separate features of the facilities, such as flood walls, dikes, etc., are described in other sections of this manual. Plate VI of Appendix "D" shows the river stages at which definite operations must be performed.

3-05. REPORTS. - a. The regulations prescribed by the Secretary of War call for reports to be submitted by the Superintendent to the Division Engineer covering inspection, maintenance and operation. Inspections of the flood protective facilities shall be made immediately prior to flood seasons, immediately following floods, and otherwise at intervals not exceeding 90 days as required by the Regulations.

(1) Floods can occur in any month of the year. Spring is the season in which the majority of the floods have occurred. The three greatest floods of record occurred as follows: the highest occurred March 1936, the second highest September 1938, and the third highest November 1927.

b. To assist the Superintendent in making his inspections a series of report forms for the individual features has been prepared. Samples of these reports are given in Appendix "C". The Superintendent will have additional copies printed for use in submitting his reports.

c. The semi-annual reports should be submitted, in triplicate, to the Division Engineer each February and August. The reports will be submitted in letter form with copies of the inspection forms covering the inspections made during the period of the report. The report shall cover the following points:

(1) A description of the maintenance work performed in the proceding six months.

(2) The number and classification of men working on maintenance, regularly and intermittently.

(3) Description of any work performed by contract on the repair or improvement of the project.

(4) Describe what use or operation of the system was made during the period being reported.

(5) Suggestions relative to public cooperation and comments concerning public sentiment on the protection obtained, are considered pertinent and desirable data for inclusion in the report, but such data are not required.

SECTION IV

DIKES

4-01. DESCRIPTION. - The dikes for the protection of the City of Chicopee are designed on sound engineering principles and are not mere piles of dirt from the handiest sources. The dikes, with the exception of the ones on the south bank of the Chicopee River east of the Boston and Maine Railroad are constructed with a core of compacted earth with a thick layer of dense impervious earth on the riverward side extending down into a cut-off trench to prevent the water from seeping through the dike, and have a sandy pervious layer of earth on the landside of the dike, to control the seepage of any water that might occur due to extended periods of high water. The dikes on the south bank of the Chicopee River east of the Boston and Maine Railroad are constructed with a core of impervious earth and have random material graded to pervious on both the riverward and landward side of the dike. The reason for this difference in design was primarily due to the local scarcity of the type of impervious material best suited for blanket type of dike design. On the riverward side of the dikes in reaches where scouring action is anticipated the slopes are riprapped, other reaches are topsoiled, sodded and seeded. On the landward side of the dikes the slopes are topsoiled, sodded and seeded. In the landward toe of the dikes there is a pervious drain of graded rock or gravel and in some cases it is supplemented by open-joint pipe. These drains collect any seepage water passing through the dikes and conduct it away from the structure.

4-02. MAINTENANCE. - a. The following quotations from the Regulations govern the maintenance of dikes.

"The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood. Measures shall be taken to promote the growth of sod, exterminate burrowing animals, and to provide for routine mowing of the grass and weeds, removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces. Where practicable, measures shall be taken to retard bank erosion by planting of willows or other suitable growth on areas riverward of the levees. Periodic inspections shall be made by the Superintendent to insure that the above maintenance measures are being effectively carried out and, further, to be certain that:

(1) No unusual settlement, sloughing, or material loss of grade or levee cross section has taken place;

(2) No caving has occurred on either the land side or the river side of the levee which might affect the stability of the levee section;

(3) No seepage, saturated areas, or sand boils are occurring;

(4) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged;

(5) Drains through the levees and gates on said drains are in good working condition;

(6) No revetment work or riprap has been displaced, washed out, or removed;

(7) No action is being taken, such as burning grass and woods during inappropriate seasons, which will retard or destroy the growth of sod;

(8) Access roads to and on the levee are being properly maintained;

(9) Cattle guards and gates are in good condition;

(10) Crown of levee is shaped so as to drain readily, and roadway thereof, if any, is well shaped and maintained;

(11) There is no unauthorized grazing or vehicular traffic on the levees;

(12) Encroachments are not being made on the levee right-of-way which might endanger the structure or hinder its proper and efficient functioning during times of emergency.

Such inspections shall be made immediately prior to the beginning of the flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days, and such intermediate times as may be necessary to insure the best possible care of the levee. Immediate steps will be taken to correct dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent."

b. To help carry out the above quoted regulations the Division Engineer recommends the following:

(1) Mow the grass when it reaches a height of about 8 inches cutting it back to a height of about 4 inches;

(2) When sections of the dike require reestablishment of turf, seeding operation should start at the earliest practicable date in the spring to secure the greatest possible protection against erosion. Areas requring seeding should be dressed to fill gullies, and irregularities in the surface removed. The surface should then be raked or harrowed parallel to the contour of the dike (never up and down) to a depth of three-quarters of an inch. The following seed mixture was used in the original construction of the dike:

Perennial Rye Grass	11.6%
Orchard Grass	25.0%
Hard Fescue	6.7%
Kentucky Blue	10.0%
Sheep Fescue	10.0%
Timothy	11.7%
Perennial Red Clover	6.7%
White Clover	6.7%
Red Top	11.6%
	100.0%

The above percentages are by weight. Reseeding should be at the rate of 45 pounds to the acre for reinforcing thin areas of grass and at the rate of 60 pounds to the acre for bare portions of the dike. Along with the seeding, each area should be given an application of a complete fertilizer at a rate to supply about 20 pounds of nitrogen per acre. The Massachusetts college of Agriculture at Amherst, Massachusetts or a recognized agronomist should be contacted for the purpose of analyzing the soil to determine if lime is needed and what fertilizer or seed mixture is best suited to the local conditions. After the seed is sown the surface should be lightly raked with iron rakes and all surfaces lightly rolled;

(3) Remove promptly from the dike any debris or drift deposits; such deposits are detrimental to the growth of grass and encourage the nesting of rats and burrowing animals who may create seepage paths through the dike by their burrowing actions;

(4) Where repairs to the dike are necessary use materials similar to those used in the original construction. Emergency repairs to the dike made during flood periods should be removed after the flood and the dike rebuilt to the original construction standards;

(5) Prohibit the establishment of paths over or on the dike since they destroy the sod and tend to cause the flow of rain water to concentrate at such points thereby eroding the dike.

4-03. OPERATION. - a The following quotations from the Regulations govern the operation of dikes:

"During flood periods the levee shall be patrolled continuously to locate possible sand boils or unusual wetness of the landward slope and to be certain that;

(1) There are no indications of slides or sloughs developing;

(2) Wave wash or scouring action is not occurring;

(3) No low reaches of levee exist which may be overtopped.

(4) No other conditions exist which might endanger the structure.

Appropriate advance measures will be taken to insure the availability of adequate labor and materials to meet all contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section."

b. To help carry out the above quoted Regulations the District Engineer recommends the following:

(1) Plan an organization for flood fighting prior to the flood, assigning foremen to the various sections of the project, with sufficient men to take care of any expected emergency. Be certain that the foremen have been instructed where and how to obtain materials they may need and that they understand their responsibility.

(2) Establish a good means of communications, instructing responsible members of the organization who and where to call for assistance and instructions and how to keep in communication in case the usual means are out of order.

(3) Determine the existence of any low reach of dike and make adequate provisions for men, materials, and equipment to raise the reach in case it is necessary.

(4) The Superintendent should personally make a final inspection just prior to the actual flood to be certain everything is in order, that his men are well posted and that the foremen know what they are supposed to do.

(5) Unauthorized traffic on the dikes should be stopped and patrolmen should be instructed to keep people off the dike unless they can show credentials authorizing their presence there.

4-04. EMERGENCY REPAIR METHODS. - a. The Superintendent or responsible members of his organization will use preventive measures to thwart any sign of deterioration and make emergency repairs to any endangered part of the structure. All such measures taken will be reported to the District Engineer immediately after the flood period.

(1) Sand Boils. - a. General. - A sand boil is the result of a transfer of pressure head and seepage from the river through a pervious stratum near or at the surface to the landside of the levee. This seepage under pressure tends to push its way to the surface and actually floats the material through which it flows. Provided the weight of the relatively impervious soil layer overlying the pervious stratum, in which the flow under pressure is occurring, is sufficient to counterbalance this pressure, no harmful effect results. When the soil stratum overlying the pervious layer is insufficient to counterbalance the upward

pressure or when no such stratum exists, boils break through the surface on the landside wherever these weaknesses are present. The sand boil may discharge relatively clear water or the discharge may contain quantities of sand and silt, depending upon the magnitude of the pressure and the size of the boil.

b. Effects of Sand Boils. Sand boils can produce three distinctly different effects on the levee, depending upon the condition of flow under the levee. These three effects are illustrated by the figures in Appendix "D" Plate "1B". In Figure 1, the seepage flow develops a definite pipe or tube under the levee. This breaks out at the landside toe in the form of one or more large sand boils. Unless checked, this flow causes a cavern to be developed under the levee, resulting in subsidence of the levee and subsequent overtopping. This case can be most easily recognized by slumping of the levee crown. Figure 2 illustrates the case where seepage flows under pressure under the levee without following a defined path, as was the case above. This flow results in one or more boils outcropping at or near the landside toe. The flow from these boils tends to undercut and ravel the slope, resulting in a sloughing of the slope. Evidence of this type of failure is found in undercutting and ravelling at the landside toe. Figure 3 shows a third type of effect of a sand boil. In this case, numerous small boils, many of which are scarcely noticeable, outcrop at or near the toe. While no boil may appear to be dangerous in itself, the consequence of the group of boils is to cause floatation of the soil, thereby reducing the shearing strength of the material at the toe, where maximum shearing stress occurs, to such an extent that failure of the slope through sliding results.

c. General Instructions for Handling Sand Boils. All sand boils should be watched closely. All boils should be marked conspicuously with flagging so that patrols can locate them without difficulty and observe changes in their condition. A sand boil which discharges clear water in a steady flow is usually not dangerous to the safety of the levee. The only action necessary in this case is to drain the excess water off to prevent it from standing near the levee. However, if the flow of water increases, and the sand boil begins to discharge material, corrective action should be undertaken immediately.

d. Method of Treatment.

(1) The accepted method of treating sand boils is to construct a ring of sand bags around the boil, building up a head of water within the ring sufficient to prevent further movement of sand and silt. The accepted method of ringing a sand boils is as follows:

(a) The entire base of the sack ring is cleared of debris, in order to provide a water-tight bond between the natural ground and the sack ring.

(b) The sacks are then laid in a ring around

the boil, with joints staggered, and with loose earth between all sacks.

(c) The ring is carried only to a height sufficient to prevent material from being discharged. The ring should not entirely stop the flow of water because of the probability of the excessive local pressure head causing additional ruptures of impervious strata and boils nearby.

(d) A "V" shaped drain constructed of two boards, or a piece of sheet metal, is then placed near the top of the ring to carry off the water.

(2) Actual conditions at each sand boil will determine the exact dimensions of the ring. The diameter and height of the ring depend upon the size of the boil, and the flow of water from it. In general, the following considerations should govern:

(a) The base width should be no less than 1-1/2 times the contemplated height.

(b) It is well to include weak ground near the boil within the ring, thereby preventing a break through later.

(c) The ring should be of sufficient size to permit sacking operations to keep ahead of the flow of water.

(3) Where many boils are found to exist in a given area, a ring levee of sand bags should be constructed around the entire area and, if necessary, water should be pumped into the area to provide sufficient weight to counterbalance the upward pressure.

(2) Sloughs. - During high water stages seeping and sloughing conditions on the landward slopes of the dike may occur. A close vigil for such occurrences should be maintained, and if they develop, observe carefully the progress of the seepage up the back slope and the amount of material that is being carried by the water. If these seepage areas become soft or if the velocity of the water becomes great enough to cause, or probably cause, erosion or sloughing of the slope, a sandbag covering shall be placed on the seeping area, beginning well out from the toe and progressing up the slope. The covering should be laid shingle fashion with the unsewed ends faced up the dike slope and placed beneath the succeeding sacks, lapping the sacks about 1/3 on the preceding sacks. If more than one layer of sacks is required, stagger the joints. The covering should extend several feet beyond the saturated area. If the material is obtainable, the affected area should be first covered with small brush straw or similar permeable material to a depth of two to four inches before placing the sandbag cover. This will permit the seep water to

get away, and also act as a filter to prevent the loss of earth from the dike. After placing the cover, the area must be observed closely and additional layers of sandbags are to be placed on the previous ones if the velocity of the flow becomes sufficient to displace appreciable material. Walking and working on the dike slope during high water conditions should be kept to the necessary minimum required, since these loads on the soft slopes will help to induce and aggravate sloughing. Do not haul the sandbags in place. See Plate IV of Appendix "D" for the treatment of sloughs.

(3) Wave wash. - Sections of the dike are likely to be damaged by wave action on broad reaches of water. During periods of high wind, high water, and ice, when waves and/or ice attack the dike, ample labor and material should be available, watchmen should look for washouts or scouring by actually wading along the submerged slope or by sounding the area with poles. If indications of washouts are discovered, sandbags should be placed immediately in the damaged area. Sandbags used for this purpose need be filled only half full but must be sewed or securely tied on the open end. The object is to obtain quickly the maximum coverage with only sifficient weight to hold the sacks in place. The sacks should be placed close together. The sacks should extend below the water surface at least two feet and further, if necessary. If the river is rising, and sacking for prevention of wave wash and attack by ice cannot be placed effectively in advance of the rising river, it is desirable to make a boom of logs, driftwood, or any available timber fastened together (sawmill style) and to string the boom along the dike slope, anchoring it about 15 feet out from the water's edge. This method is particularly effective against ice.

(4) Scouring. - During high water careful observations should be made of the riverside slopes of the dike at all localities where relatively high velocities are likely to occur, such as slopes not protected by riprap, dike angles, road crossing ramps, or traverses. If any indication of scour is observed, prompt action shall be taken to avoid further scouring by deflecting the current away from the dike by constructing deflection dikes, using available material such as brush, tree tops or lumber, or by sandbagging the slopes or dumping rock on the slope.

(5) Raising of dike. - See Appendix "D" for as-built profiles and a list of pertinent bench marks. In emergencies, low reaches of the dike, time and other conditions permitting, can be raised about three feet with reasonable safety. Methods most commonly used for this purpose are outlined in the following paragraphs and are recommended in the order listed:

(a) Sandbag topping. - The sacks commonly used are 100-pound grain or feed sacks. Smaller sacks, if made of fabric, can be used. One hundred pound grain sacks, when filled with a cubic foot of earth weighing approximately 100 pounds, will provide a unit about 6 inches high, one foot wide and two

feet long. The sacks need not be sewed or tied on the open ends; place the loose ends of sacks on top of preceding sacks. The front line of sandbags in the first layer should be laid stretcher-wise or along the dike, unsewed ends upstream. Other sacks in the first layer are laid crosswise the dike unsewed ends to the riverside. The sacks in the second layer are laid crosswise to the dike alignment breaking the joints on the first layer; the third layer is similar to the first layer and succeeding layers are so alternated until the desired height is reached. The sandbags should be well tramped or mauled in place. Exposed ends of sandbags must be tucked underneath the bags. A crew of 50 men should fill, carry and place approximately 1500 sacks per eight hour day, all hand labor, when the source of material is within 150 feet of the point of placement. Production will depend on conditions at the site. Plate I of Appendix "D" shows this method of construction.

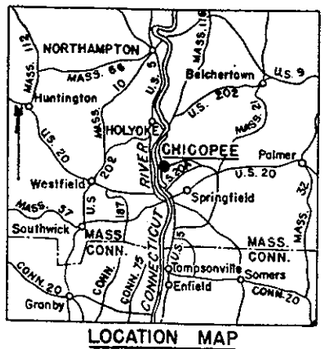
(b) Lumber and sandbag topping. - Raising of low reaches of dike grade by lumber and sandbag topping is a very good method. The chief objection is the time element of installation. In erecting this type of topping, a line of levels should be run and grade stakes set in advance. Two by four or two by six stakes should then be driven well into the ground on the riverside of the dike crown on six-foot centers and one-inch thick boards nailed on the landside of the stakes. Back up this wood wall with sandbags, laying the row next to the boards in the first layer lengthwise the dike, other sacks in this layer crosswise the dike. This type wall backed by one tier of sacks will hold out about one foot of water. If additional height is required, build the planking up and raise the sandbag backing, placing layers of sandbags as outlined in the preceding paragraph. The stakes should be driven at least 3 feet into the ground, leaving three feet out of the ground; in extreme conditions this type construction, if properly backed by sandbags, will hold out three feet of water. See Plate II of Appendix "D" for a sketch of this type of construction. Well tamped impervious earth may be substituted for the sandbags if deemed to be more advantageous.

(c) Cut crown topping is the method whereby the material in the dike on the landward side of the center line crown is excavated and used to build up the riverside of the dike crown. The cut should never exceed one foot nor be nearer the riverside of the dike then the center line of the crown. This is a very hazardous undertaking and should not be resorted to except in the greatest extremity and only after permission of the highest City authorities has been obtained.

(6) Toe drains. - Frequent examinations should be made of the toe drain outlets, and if muddy water appears and increases in intensity its source should be immediately determined and the source isolated from the toe drains and controlled by building a sub-dike around it to create just sufficient counter-head to stop the displacement of material.

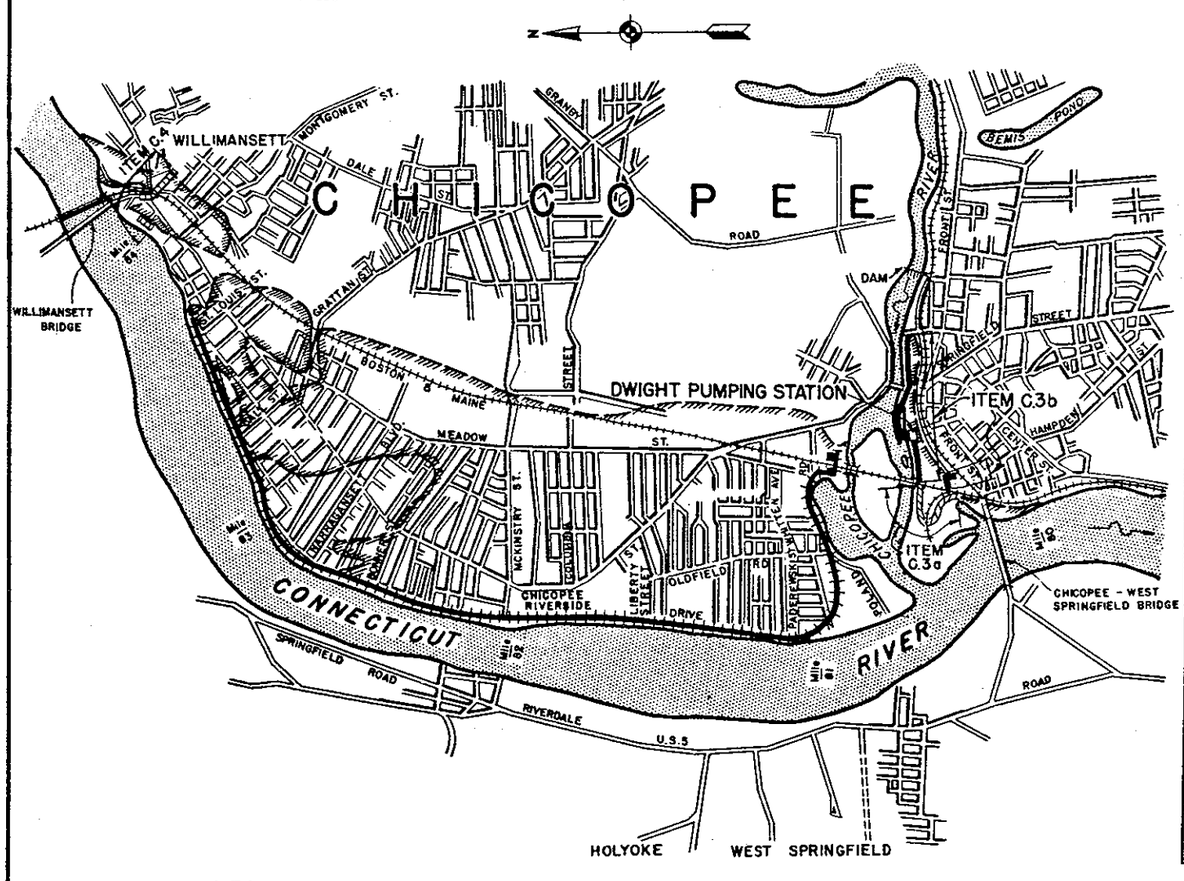
WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY



LOCATION MAP

SCALE 1"= 8 MILES



VICINITY MAP

SCALE 1"= 1500'

LEGEND

- Dikes completed Item C1 and C2.
- Item C.3a Fiscal Year 1940 Unit, West of B.&M. R.R. South Bank Chicopee River, under construction.
- Item C.3b Fiscal Year 1940 Unit, South Bank Chicopee River.
- Item C.4 Fiscal Year 1940 Section Willimansett Dike
- Overflow Limits, March 1936 Flood.

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KEY	DATE	REVISION (Indicated by △)	REV. BY	CK. BY	AP. BY

CONNECTICUT RIVER FLOOD CONTROL

DIKE-SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

PROJECT LOCATION AND INDEX

CONNECTICUT RIVER — CHICOPEE, MASS.

IN 110 SHEETS — SCALE: 1 IN. = 1500 FT. (1500' 0 1500 3000') — SHEET NO. 1

U.S. ENGINEER OFFICE, PROVIDENCE, R.I., MAY 1940

SUBMITTED: Kenneth B. Keyes, SENIOR ENGINEER, HEAD, DESIGN SECTION

APPROVED: RECOMMENDED: P.P. Burns, PRINCIPAL ENGINEER, CHIEF, F.C. ENGINEERING DIV.

APPROVED: [illegible], LT. COL. CORPS OF ENGINEERS, DISTRICT ENGINEER

DESIGNED: P.C. Hanscomb, ASST. ENGINEER

DRAWN: W.S.B.

TRACED: B.S. & E.A.H.

CHECKED: [illegible]

FISCAL YEAR 1940

FILE NO. CT-4-2322

C.3b

1

SECTION V

WALLS

5-01. DESCRIPTION. - In general, the walls are of the reinforced concrete cantilever type, consisting of a vertical wall, or stem, on a base with a concrete key. Where required a steel sheet pile cutoff wall is driven and the top of the piling is embedded in the concrete key. The wall protecting the Moore Drop Forge Plant is set on concrete bearing piles and the foreshore slope covered with an impervious earth blanket, from the base of the wall down to the river bed, tying into a wood sheet pile cutoff wall driven at the bottom of the slope. A portion of the wall opposite the Springfield Rendering Company is a reinforced concrete extension doweled into an existing wall. North of the Springfield Rendering Company to high ground there is a reinforced concrete cap wall with a steel sheet pile cutoff wall. At the toe on the landward side of all walls there is a porous drain to collect any seepage water and conduct it away from the structure. The walls are backfilled to suitable elevations to provide surface drainage. The foreshore slopes are riprapped where there is danger of scour.

5-02. MAINTENANCE. - a. The following quotations from the Regulations govern the maintenance of dikes.

"Periodic inspections shall be made by the Superintendent to be certain that:

(1) No seepage, saturated areas, or sand boils are occurring;

(2) No undue settlement has occurred which affects the stability of the wall or its water-tightness;

(3) No trees exist, the roots of which might extend under the wall and offer accelerated seepage paths;

(4) The concrete has not undergone cracking, chipping, or breaking to an extent which might affect the stability of the wall or its water-tightness;

(5) There are no encroachments upon the right-of-way which might endanger the structure or hinder its functioning in time of flood;

(6) Care is being exercised to prevent accumulation of trash and debris adjacent to walls, and to insure that no fires are being built near them;

(7) No bank caving conditions exist riverward of the wall which might endanger its stability;

(8) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged.

Such inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days. Measures to eliminate encroachments and effect repairs found necessary by such inspections shall be undertaken immediately. All repairs shall be accomplished by methods acceptable in standard engineering practice."

b. To help carry out the above quoted Regulations the District Engineer recommends the following:

(1) Check the expansion joints during the inspections as they will readily show any signs of settlement or movement that might occur to the walls.

(2) When the expansion joint material has deteriorated to the point where it no longer serves its purpose the loose material should be cleaned out, care being exercised not to injure the copper seal, and the joint poured full with asphalt.

(3) Keep weeds, grass and brush cut down to eliminate fire hazards that might injure the walls.

5-03. OPERATION. - a. The following quotations from the Regulations govern the operation of walls.

"Continuous patrol of the wall shall be maintained during flood periods to locate possible leakage at monolith joints or seepage underneath the wall. Floating plant or boats will not be allowed to lie against or tie up to the wall. Should it become necessary during a flood emergency to pass anchor cables over the wall, adequate measures shall be taken to protect the concrete and construction joints. Immediate steps shall be taken to correct any condition which endangers the stability of the wall."

b. The recommendations made in paragraph 4-03 b for dikes apply equally as well to the operation of the walls.

5-04. EMERGENCY REPAIR METHODS. - a. The Superintendent or responsible members of his organization shall take immediate action to correct any condition which endangers the stability of the wall. All such measures taken will be reported to the District Engineer immediately after the flood period.

(1) Sand boils. - See Section IV, Paragraph 4-04 a (1), for a description and treatment of sand boils.

(2) Toe drains. - Frequent examination should be made of the toe drain outlets and if muddy water appears and increases in intensity its source should be immediately determined

and the source isolated from the toe drain and controlled by building a sub-dike around it to create just sufficient counter-head to stop the displacement of material.

(3) Monolith joints. - If appreciable leakage occurs at vertical monolith joints, it can be controlled by dumping cinders, sawdust, or other such material on the river-side of the wall. The dumped material will be carried into the joint by the water and plug the leak.

(4) Raising grade of wall. - In the event there is danger of the walls being overtopped by the flood, they can be raised, with reasonable safety, to three feet abo their present grade. One tier of sandbags placed with the unsewed ends upstream and beneath the forward bag will add a height of approximately six inches to the wall. If the wall grades are to be raised beyond six inches it can be best accomplished by erecting a wooden extension such as shown on Plate V of Appendix "D".

SECTION VI

DRAINAGE STRUCTURES

6-01. DESCRIPTION. - a. The drainage structures passing through or under the flood walls and dikes are as follows:

(1) Fiscal Year 1939 Section. -

(a) Located at Station 25+66 is a 6'x6' reinforced concrete conduit which is the discharge outlet from the Call Street Pumping Station. The flow of water in the conduit is controlled by a sluice gate located at the pumping station.

(b) Located at Station 93+46 is a 6'x6' reinforced concrete conduit which is the discharge outlet from the Jones Ferry Pumping Station. This conduit has a sluice gate at both ends to control the flow of water.

(c) Located at Station 153+22.5 is a 60" reinforced concrete pipe which is the discharge outlet from the Paderewski Pumping Station. The flow of water in this pipe is controlled by a sluice gate located at the pumping station.

(d) Located at Station 183+50 is a 36" cast iron pipe cross drain with a gate valve on the intake end and a flap valve on the discharge end. This pipe provides for the normal surface drainage from behind the dike.

(e) Located at Station 200+13 are two 36" cast iron pipes which are the discharge outlets from the Bertha Avenue Pumping Station. The flow of water in the pipes is controlled by flap valves on the discharge ends of the pipes and by a sluice gate in the discharge chamber of the pumping station.

(2) Dike South Bank of Chicopee River Section -

(a) Located at Station 4+78.8 is gate structure No. 1 with a 5'-6" x 8' opening to control the flow of water through the flood wall from Tailrace No. 1.

(b) Located at Station 8+89.93 is gate structure No. 2 with a 6'-6" x 9' opening to control the flow of water through the flood wall from Tailrace No. 2.

(c) Located at Station 20+60 is gate structure No. 3 with twin 9'x9' openings to control the flow of water through the flood wall from Tailrace No. 3.

(d) Located at Station 22+20 is Tailrace No. 4 which is the discharge from the Dwight Power Station. This conduit passes beneath the wall and allows the power station to operate during flood periods.

(e) Located at Station 22+91.3 is a 30" reinforced concrete pipe drain from Manhole No. 11. This drain has a flap valve on the discharge end and a sluice gate on the manhole end.

(f) Located at Station 28+45 is a 16" cast iron pipe drain from Manhole No. 20. This drain has a flap valve on the discharge end and a sluice gate on the manhole end.

(g) Located at Station 31+58 is an 8" cast iron pipe drain from Manhole No. 21. This drain has a flap valve on the discharge end and a gate valve in the manhole.

(h) Located at Station 40+71 is a 12" cast iron pipe drain from Manhole No. 22. This drain has a flap valve on the discharge end and a gate valve in the manhole.

(3) Fiscal Year 1940 Section -

(a) Located at Station 1+90 is a 10" cast iron pipe which is the pressure discharge from the Moore Drop Forge Company's pumping plant. This pipe has a flap valve on the discharge end.

(b) Located at Station 1+98 is an 18" cast iron pipe drain from a manhole which collects the water from the toe drains. This drain has a flap valve on the discharge end and a sluice gate on the manhole end.

(c) Located at Station 13+90 is a 8" cast iron water main which passes under the dike.

(4) Chicopee Town Line to High Ground Section -

(a) Located at Station 74+78 is an 18" vitrified clay sewer pipe outlet from a manhole near the Byrolly Trucking Company. A gate valve is being installed on the manhole end of the pipe to prevent backwater from flooding in rear of the wall.

(b) Located at Station 75+07 are two 12" cast iron pipe suction lines to the pumping plant in the Byrolly Trucking Company's building. These pipes have cut-off valves inside the trucking company building.

(c) Located at Station 76+16 is a 12" vitrified clay pipe drain from the H. L. Handy Company's plant.

(d) Located at Station 76+21 is a 12" cast

iron pipe suction line to the pumping station in the H. L. Handy Company's yard. This pipe has a shut-off valve in the pumping station.

(e) Located at Station 77+32 is a 12" vitrified clay pipe drain from the H. L. Handy Company's yard. This pipe has a flap valve on the discharge end.

(f) Located at Station 81+10.6 is a 72" pressure sewer.

(g) Located at Station 82+45 is a 36" cast iron pipe which is the discharge outlet from the Plainfield Pumping Station. The flow of water in this pipe is controlled by a sluice gate in the pumping station and a flap valve on the end of the pipe.

(h) Located at Station 84+93 is a 12" cast iron pipe drain from Manhole No. 2. This pipe has a gate valve on the manhole end.

(i) Located at Station 88+56 is a 12" cast iron pipe drain from a catch basin just behind the wall. This pipe has a gate valve on the catch basin end.

6-02. MAINTENANCE. - a. The following quotations from the Regulations govern the maintenance of drainage structures:

"Maintenance. Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash, drift, or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on drainage structures shall be examined, oiled, and trial operated at least once every 90 days. Where drainage structures are provided with stop-log or other emergency closures, the condition of the equipment and its housing shall be inspected regularly and a trial installation of the emergency closure shall be made at least once each year. Periodic inspections shall be made by the Superintendent to be certain that:

(1) Pipes, gates, operating mechanism, riprap, and headwalls are in good condition;

(2) Inlet and outlet channels are open;

(3) Care is being exercised to prevent the accumulation of trash and debris near the structures and that no fires are being built near bituminous coated pipes;

(4) Erosion is not occurring adjacent to the structure which might endanger its water tightness or stability.

Immediate steps will be taken to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspections."

b. To help carry out the above quoted regulations the Division Engineer recommends the following:

(1) Place markers at each pipe that passes under the dikes and walls so they can be readily found during flood periods.

(2) Make agreements with the mill owners for the maintenance and operation of the gate structures controlling the tail races from their mills.

6-03. OPERATIONS. - a. The following quotations from the regulations govern the operation of drainage structures:

"Operation. Whenever high water conditions impend, all gates will be inspected a short time before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates shall be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves shall be closed as necessary to prevent inflow of flood water. All drainage structures in levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse condition."

b. To help carry out the above quoted regulations the Division Engineer recommends the following:

(1) In the event of a threatened blowout to the ground surface by a sewer, during flood periods, it can usually be controlled by loading the area with sandbags. If such a blowout should occur control it by building a sandbag subdike around the blowout.

(2) Allow sufficient time and labor for closing the gates on the drainage structures. Notify the proper parties at the mills, to close the gates, for which they are responsible, and check to see if the closures are made.

c. For the sequence of operation of the drainage structures when a flood is imminent, see Plate VI of Appendix "D".

SECTION VII

CLOSURE STRUCTURES

7-01. DESCRIPTION. - There are three closure structures in the flood protection system for the City of Chicopee; all three are the stop-log type. The purpose of the closures is to permit passage of traffic through the flood protection facilities during non-flood periods.

a. Stop-log Structure No. 1 is located northwest of the Depot Street underpass and permits the railroad spur track to Turners Falls Power and Electric Company to pass through the earth dike. This structure has a clear span of 19 feet, a sill elevation of 64.87, and the top elevation of the opening is 72.93. Two hoist frames that fit in pipe sockets in top of the abutment walls were furnished to assist in the placing of the stop-log timbers.

b. Stop-log Structure No. 2 is located across Depot Street just northerly of the branch track of the Boston and Maine Railroad to Chicopee Falls. This structure has a clear span of 36 feet, a sill elevation of 66.5 and the top elevation of the opening is 70.6. This structure has at the center of its span a removable H beam which divides the span into two parts and is used to receive one end of the timbers when the closure is made; the other ends of the timbers fit into recess slots provided in the abutment walls.

c. Stop-log Structure No. 3 is located in the earth dike west of Bertha Avenue and permits the double track main line of the Boston and Maine Railroad to pass through the dike. This structure has a clear span of 31 feet, a sill elevation of 67.46 and the top elevation of the opening is 72.93. At the center of this structure, there is a removable steel support which divides the span into two parts and is used to receive one end of the timbers when the closure is made; the other ends of the timbers fit into recess slots provided in the abutment walls. Special bottom timbers with notches to fit around the railroad rails were provided for this closure.

7-02. MAINTENANCE. - a. The following quotations from the regulations govern the maintenance of closure structures:

"Maintenance. Closure structures for traffic openings shall be inspected by the superintendent every 90 days to be certain that:

(1) No parts are missing;

(2) Metal parts are adequately covered with paint;

(3) All movable parts are in satisfactory working order;

(4) Proper closure can be made promptly when necessary;

(5) Sufficient materials are on hand for the erection of sand bag closures and that the location of such materials will be readily accessible in times of emergency.

Tools and parts shall not be removed for other use. Trial erections of one or more closure structures shall be made once each year, alternating the structures chosen so that each gate will be erected at least once in each 3-year period. Trial erection of all closure structures shall be made whenever a change is made in key operating personnel. Where railroad operation makes trial erection of a closure structure infeasible, rigorous inspection and drill of operating personnel may be substituted therefor. Trial erection of sand bag closures is not required. Closure materials will be carefully checked prior to and following flood periods, and damaged or missing parts shall be repaired or replaced immediately."

b. To help carry out the above quoted Regulations the Division Engineer recommends the following:

(1) Store the stop-log timbers in the city yard on Front Street. The timbers should be kept in a shed to protect them from the weather and stacked with strips of lumber between them at the end, quarter and mid points. Keep the timbers for each structure in separate piles and place a sign on each pile to identify which stop-log structure the timbers belong to.

7-03. OPERATION. - a. The following quotations from the Regulations govern the operation of closure structures:

"Operation. Erection of each movable closure shall be started in sufficient time to permit completion before flood waters reach the top of the structure sill. Information regarding the proper method of erecting each individual closure structure, together with an estimate of the time required by an experienced crew to complete its erection will be given in the Operation and Maintenance Manual which will be furnished local interests upon completion of the project. Closure structures will be inspected frequently during flood periods to ascertain that no undue leakage is occurring and that drains provided to care for ordinary leakage are functioning properly. Boats or floating plant shall not be allowed to tie up to closure structures or to discharge passengers or cargo over them."

b. To help carry out the above quoted regulations the Division Engineer recommends the following:

(1) During flood periods the erection of closure structures should be started in sufficient time to ensure the complete closing of the gap before water reaches the sill of the closure. The location of the closures is described in paragraph

7-01 and indicated on Plate VI of Appendix "D", which also shows the river gage reading at which the openings should be closed to prevent flooding of the areas back of the openings. Public and private parties whose passage through the closure structures are affected by the stopping of the gap should be notified of the intended closing in sufficient time to permit them to evacuate unprotected areas. Determination of the time at which any closure erection should be started must be based upon the rate of river rise and time required for installation. Rate of rise of the river may be expected to range up to 0.8 feet per hour during the period required to effect the closures (see Paragraph 3-04 b (7) for advice on river predictions).

(2) The first step in erecting any of the closures is to clean off the sill. The second step on closure No. 1 is to chink around the railroad rails with sandbags to fill up the notch provided in the sill for the passage of the track. The third step is to place the timbers across the opening with the ends of the timbers fitted into the recess slots in the abutment walls. This is accomplished by raising one end of the timber higher than the other then entering the ends of the timber in the abutments, recess slots and lowering the timbers in place. After all the timbers are placed wedge the two top timbers by driving wedges between the front of the recess slot and the timbers. This will keep the timbers from floating. The second step in erecting closures Nos. 2 and 3 is to erect the center support in the middle of the span. After the center support is erected proceed with placing the timbers across the opening as described for closure No. 1 above. The bottom timbers for closure No. 3 are special timbers with notches to fit around the railroad rails. Chink any openings left between the rails and the notches with bags.

(3) After the stop-log timbers are in place, canvas or sisalcraft paper should be tacked over the riverside of the timbers to prevent undue leakage of water through the cracks between the timbers. The timbers are sufficiently strong to take the load placed on them by high water without the use of sandbag reinforcement. However, if excessive high water necessitates the raising of the height of the structure, a sandbag wall should be constructed on the landward side of the timbers with the base width of the wall twice the height of the wall. Ample time should be allowed to erect the closures and due allowance must be made for the fact that the erection time of the closures overlap and at least two structures will be under erection at the same time. It must be recognized that delays in operation may be occasioned by inexperienced help and other contingencies. After erection, when the rising water has reached the closure, some leakage may occur. Excessive leakage can be prevented by the use of cinders, sawdust or some other such sealing materials dumped over the river face of the structure. The force of the water will carry the materials into the cracks and stop the leakage. The closure structures should be inspected frequently to see if undue leakage is occurring.

(4) The estimated time for installing the closures by a trained crew equipped with the necessary tools, parts and material is shown in the following table:

Movable Closure	Size of Crew	Time Required
Stop-log Structure No. 1	6 men	3 hours
Stop-log Structure No. 2	5 men	3 hours
Stop-log Structure No. 3	7 men	3 hours

(5) Care should be exercised to avoid removal of stop-logs during a temporary recession of flood waters which might be followed immediately by a second crest. When all danger from the flood has passed, the closure structures should be dismantled, the parts thoroughly cleansed, metal parts painted if needed, damaged parts replaced or repaired, and all movable parts stored in their proper places.

SECTION VIII

PUMPING STATIONS

8-01. DESCRIPTION. - a. Six pumping stations were constructed by the War Department in the City of Chicopee, to dispose of the sewage and interior drainage during high water periods. The stations have substructures of reinforced concrete and superstructures of structural steel and brick, or reinforced concrete. The stations are provided with sufficient pump capacity to discharge the maximum design run-off based on the existing developments in the drainage areas. Space was provided, in the Jones Ferry and Paderewski Stations, for a future pump installation to care for possible future developments in the drainage area. In Call Street, Jones Ferry, and Paderewski Pumping Stations, in addition to the storm water pumps, one electric-driven 16-inch sewage pump was installed to pump the normal flow of sewage at such periods when the river is at high water stages and no storm water is to be pumped from within the protected area. The storm water pumps, are driven by gasoline engines directly connected through flexible couplings to right angle gear units, which transmit the power through a set of spiral bevel gears to the vertical pump shaft. The stations are provided with other facilities such as trash racks, sluice gates, valves, overhead cranes, carbon dioxide fire extinguishing systems, switchboards or panels, etc., to make a reliable, workable and complete installation.

b. Pumping Station Equipment. - (1) Pumping Station No. 1 - Plainfield Street. - This pumping station contains two 16-inch gasoline-engine-driven volute pumps, designed to handle all anticipated sewage and storm water flows. A swing check valve is provided in the discharge of each pump to facilitate starting and prevent backflow through the pump. Gate valves are provided on both the suction and the discharge of each pump for use in the event the check valve fails to operate and to permit maintenance and repair of the pumps at all river conditions. The engines are radiator-cooled and exhaust cooling air from the engine room to the outdoors.

(a) Two hand-operated sluice gates are provided - one a seating pressure gate on the inlet to the pump suction conduit and the other an unseating pressure gate on the intake to the outlet conduit.

(b) Electricity is supplied by single-phase 115 volt underground feeder from the power company's lines. A battery charger is provided to permit the engine batteries to be kept at a full charge at all times. Two twelve volt emergency lights fed from the engine batteries are installed, one in the engine room and one in the pump room.

(2) Pumping Station No. 2 - Dwight. - This station contains three gasoline-engine-driven propeller pumps which take water from the canal serving as an outlet for a mill tailrace. The pumps are equipped with gate valves for emergency use and flap valves to facilitate normal pumping operations.

(a) Two electrically-operated gates are provided on the inlet to the pump sump to permit dewatering of the sump at any elevation of the water in the canal. A sump pump is provided to dewater the sump for maintenance or repair purposes.

(b) Electric energy is supplied the station at 3-phase, 230 volts, 60 cycles. A 5 KVA transformer within the single panel switchboard furnishes single phase, 115-volt energy for lighting and receptacle circuits. A battery charger is provided in the switchboard to permit charging of the engine batteries. Individual rheostats and ammeters are provided on the switchboard in each battery circuit so that the charging rate to each battery may be adjusted to the requirements of the battery.

(3) Pumping Station No. 3 - Bertha Avenue. - (a) This pumping station has two twenty-four-inch gasoline-engine-driven volute pumps. A storage pond is provided behind the station to store any inflow that exceeds the capacity of the pumps and to provide for flexibility of pumping operations.

(b) The pumps are provided with gate valves on both intake and discharge lines and also check valves in each discharge. The pumps discharge into a conduit extending from the storage pond through the dike. The discharge conduit is protected by a flap valve on the outlet end and is provided with a hand-operated unseating pressure sluice gate on the intake at the storage pond.

(c) Electric energy is supplied by a single phase, 230/115 volt, 60 cycle line for lighting and a battery charger. An oil burning stove furnishes heat to prevent the condensation of moisture on the interior of the pumping station.

(4) Pumping Station No. 4 - Paderewski Street - Pumping Station No. 5 - Jones Ferry - Pumping Station No. 6 - Call Street. - (a) These three pumping stations are very similar, each having either two or three gasoline-engine driven propeller pumps, and one electrically-driven 16-inch volute pump for sewage. The propeller pump equipment in the three stations is as follows:

Paderewski Street. - Two 30-inch gasoline-engine driven propeller pumps with gate valves and flap valves.

Jones Ferry. - Three 36-inch gasoline-engine-driven propeller pumps with check valves.

Call Street. - Three 42-inch gasoline-engine-driven propeller pumps with gate valves and flap valves.

(b) The electrically-driven 16-inch sewage pumps are designed to handle all sewage flows and are provided with an adjustable speed control so that the pump speed may be varied to suit the inflow.

(c) Electric energy to each pumping station is 230 volts, 3-phase, 3-wire. The switchboard in each station is a dead front, fully enclosed switchboard with manually-operated air circuit breakers for the control and protection of all feeders emanating from the switchboard. Each switchboard contains a voltage regulator for the gasoline-electric generator unit, a battery charger for all engine batteries, and the adjustable speed control for the 16-inch sewage pump. Each main air-circuit breaker on the incoming feeder is interlocked with the main air-circuit breaker on the generator feeder so that only one can be closed at any time. A drum controller, providing five different speeds varying from half to full speed for the 16-inch sewage pumps, is mounted in each switchboard with the secondary resistors mounted on the wall in the rear of the board. These resistors are designed so that the pumps may be operated continuously at any speed without damage to the resistors. The magnetic contractors operated by the push button stations are interlocked with the lowest speed of the controllers so that the pumps cannot be started unless the drum controller is in the starting position, thus inserting a maximum of resistance in the rotar circuits of the 16-inch pump motors. The battery chargers are copper oxide units having both the primaries and secondaries protected by fuses located within the switchboard enclosures.

(d) Each station has a gasoline-engine-driven generator having a rated output of 93.8 KVA at 80 percent power factor or 75 KW, 240 volts, three-phase. The capacity of each generator is sufficient to operate all electrically-driven pumps, miscellaneous accessories, and lighting in the pumping station.

(e) Two electrically-operated sluice gates are provided at each station - one gate to close off the gravity conduit at times of high water and one gate on the intake to the propeller pump sump to permit closing of the sump for pump maintenance or repair purposes.

(f) In each station a sump pump is provided in the propeller pump sump to provide for dewatering the room completely after the water has been lowered as far as possible with the propeller pumps. At the Call Street and Paderewski Pumping Stations the piping to the engine cooling water systems is so arranged that the discharge of the sump pumps may be connected to the engine cooling water piping to permit operation of the gasoline engines in the event the municipal water supply should fail. At the Jones Ferry Pumping Station an emergency water pump is installed in the boiler room to supply engine cooling water if the municipal system should fail. The discharge of this pump is connected to the engine cooling water system through a swing connection arranged so that it is impossible for any of the discharge from the emergency water pump to enter the sanitary water supply system.

(g) Movable trash racks are provided at the pump intake chambers to screen out any large objects that might damage or clog the pumps during pumping operations. Manual

hoists are provided on the trash racks in order to facilitate cleaning the racks and to allow the racks at the Call Street Pumping Station to be raised at periods of low water in the river, thus allowing all debris to flow by gravity to the river.

(h) An oil-fired low-pressure steam heating system is provided to eliminate the necessity of draining the complete water system after each routine maintenance operation in the winter months, to facilitate starting the engines, and to prevent the sewers humidity conditions that would prevail without a heating system.

8-02. MAINTENANCE - a. The following quotations from the regulations govern the maintenance of pumping stations:

"Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be taken to provide for cleaning plant, buildings, and equipment, repainting as necessary, and lubricating all machinery. Adequate supplies of lubricants for all types of machines fuel for gasoline or diesel powered equipment, and flash lights or lanterns for emergency lighting shall be kept on hand at all times. Telephone service shall be maintained at pumping plants. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subjected to undue dampness and otherwise at intervals not to exceed one year. A record shall be kept showing the results of such tests. Wiring disclosed to be in an unsatisfactory condition by such tests shall be brought to a satisfactory condition or shall be promptly replaced. Diesel and gasoline engines shall be started at such intervals and allowed to run for such length of time as may be necessary to insure their serviceability in times of emergency. Only skilled electricians and mechanics shall be employed on tests and repairs. Operating personnel for the plant shall be present during tests. Any equipment removed from the station for repair or replacement shall be returned or replaced as soon as practicable and shall be trial operated after reinstallation. Repairs requiring removal of equipment from the plant shall be made during off-flood seasons insofar as practicable."

b. To help carry out the above quoted regulations the Division Engineer recommends the following:

(1) General. - Proper maintenance of the pumping stations requires periodic operation of all equipment at frequent intervals to keep equipment in good working order and all parts well lubricated and free from corrosion. Periodic operation of equipment also permits an inspection of the functioning of all equipment so that defective parts may be properly replaced or repaired before their use is required for pumping operations. Inasmuch as mechanical and electrical equipment deteriorates more

rapidly from idleness than from continued use, a thorough and complete maintenance routing is justified.

The heating systems should be kept in operating during the colder months to prevent freezing of water in pipes and cooling water jackets, and also to prevent condensation of moisture on equipment within the building.

(2) Gasoline engines. - Once a week, all gasoline engines should be run for two hours. The operation of the engines for this length of time is necessary to get the crankcase oil warmed up sufficiently to evaporate any gasoline that entered the crankcase during starting and to evaporate any moisture that is in the crankcase oil due to condensation. During this period of operation the functioning of the engine and accessories should be checked for proper performance. The following are the principal items to be checked:

(a) Water temperature.

(b) Ignition - open all ignition switches but one and test each ignition circuit separately in this manner.

(c) Heating of cylinder blocks - place hand on different portion of each block. Temperatures shall be approximately equal.

All engines should be run at full rated speed during the maintenance routine after the warm up period. When insufficient water is available for pumping the flexible couplings between the engines and the gear units should be disconnected. The propeller pumps should never be operated for more than a minute without water in the sump because the bronze rings in the pump bowl require water for lubrication. Operation of the pumps for extensive lengths of time without water above the level of the impeller could result in the bronze rings "freezing", thus requiring extensive repair work.

The oil in the engines should be changed twice a year or after every 100 hours of operation, whichever is more frequent. At the time of oil changing the oil filters should be removed and cleaned.

The drain valve at the base of the vertical exhaust pipes should be opened once a month while the engine is in operation to allow the condensate collected in the pipe to drain before it collects sufficiently to back up into the exhaust manifold and into the cylinders.

Once a year the alignment, both angular and parallel, of the flexible coupling between the engine and the gear unit, should be checked with a parallel bar and feeler gauges. If misalignment is present, either angularly or in a parallel direction, and exceeds .012 inch the gear unit should be realigned with the engine.

(3) Pumps. - (a) No maintenance of the propeller pumps is ordinarily required except that necessary to keep them painted and lubricated. Once each month the flexible coupling between the engines and the gear units should be assembled and the pump run at one half speed for thirty seconds. An occasional inspection should be made of the impellers to see that they are free from debris. Once a year the clearances of each impeller should be checked by running a feeler gauge between each impeller blade and the pump casing. At the point of minimum clearance of each impeller the gap should be between .020 and .040 inch. If the minimum clearance is found to be less than .020 inch the impeller should be raised by adjusting the thrust nut on top of the pump shaft in the upper part of the gear unit.

(b) The volute pumps should be turned once a week by starting the motors or engines for about three seconds. This will allow the motor and pump to come up to approximately half speed and thus spread a film of oil over all bearings. Volute pumps should never be run for more than thirty seconds without water in the casing because the sealing rings depend upon water for lubrication and cooling.

(c) The sump pumps should be started once a week and run for three seconds.

(4) Switchboard, wiring and motors. - The switchboards should be completely checked once a year. Insulators should be cleaned, all lugs and connections checked and tightened, and ground connections checked for continuity. The insulation resistance of all circuits and motors should be measured once a year. The result of each of these measurements should be plotted on a chart with insulation resistance as the abscissa and time in years as the ordinate. This will show the change in condition of circuits and motors from year to year and will allow remedial measures to be taken before breakdown occurs. Rings and commutators should be cleaned yearly and motors and the generator blown out with dry compressed air at similar intervals.

(5) Gear units. - The gear units should show a flow of oil through the sight glass at all times while in operation. If the flow is not present the unit should be immediately shut down and the cause of the lack of oil corrected.

The oil in the gear units should be changed every two years. Every six months the cover plate on the side of the gear unit should be removed and the condition of the teeth inspected for proper tooth contact.

A pair of shear pins is provided in the top of each gear unit to allow the high speed shaft to run free of the pump shaft in the event debris clogs the impeller. Spare shear pins should be provided and kept on hand to replace any broken ones.

(6) Gates and valves. - All gates and valves should be raised or lowered a short distance weekly. Electrically operated gates should be moved through a complete closing and opening cycle monthly. At this same monthly interval the sills of the gates should be cleaned of silt and debris.

There are on each electrically operated gate hoist some resistors located within the motor control panel in series with the indicating lights. Inasmuch as these resistors will emit a little heat when the indicating lights are on, it is recommended that at all times the feeders to the electrically operated gate valves and gates be kept energized and the indicating lights kept lighted so that the resistors will provide a little heat to combat any moisture that enters the control panel.

The limit switches should be inspected once a year, contacts cleaned, and the limit switch oil changed with fresh transformer oil.

The gate stems should be kept cleaned and covered with a thin film of grease to protect them.

(7) Storage batteries. - The storage batteries should be kept properly filled with distilled water. Water from the municipal system should not be used. The batteries should be kept fully charged at all times. The specific gravity of the batteries at full charge is between 1.210 and 1.225.

It is important to keep the tops of the batteries clean because a layer of foreign material, such as dirt, grease or moisture, will allow small currents to flow between terminals thus discharging the battery constantly.

(8) Fire protection equipment. - All carbon dioxide cylinders should be weighed every six months to determine their condition. The gross weight of each cylinder, fully charged, is stamped on the cylinder. If the gross weight is less than that stamped on the cylinder, the cylinder should be promptly recharged.

(9) Heating system. - The boilers should be cleaned once a year by opening the mud valves at the base of the boiler and drawing off the sediment. Each fall before the heating systems are put into operation the oil burner and controls should be thoroughly checked by a competent oil burner mechanic.

(10) Painting. - All metal surfaces not otherwise protected must be kept painted to maintain the metal in good condition. The exterior metal work, such as pipe railings, trash racks, cover plates, exterior gate hoist, flap valves, will require frequent painting because of exposure to the weather.

The silencers should be kept painted with a high temperature paint.

The metal surfaces in the propeller pump sump will require frequent painting due to the severe moisture conditions. Although the pump columns are constructed from corrosion-resisting steel, the bolts and nuts on the pumps are cold rolled steel and must be kept protected.

The sluice gates must be painted occasionally to prevent the cast iron from deteriorating.

(11) Propeller pump sump. - After each period of high water during which the propeller pumps have been used, the sump should be emptied of water and the sump cleaned of all silt and debris. Most of the deposit on the floor can be washed into the sump pump by a stream of water from a hose and then removed with the sump pump. Any large debris, sticks, stones, rags, etc., should be removed manually. After the floor has been cleaned the sump pump should be cleaned of all foreign matter.

(12) Silencers. - Due to the horizontal position of some silencers, moisture will collect within the silencers and corrode the inside. It is suggested that, if possible, the drain plugs on these silencers be removed and the drain holes left open. The small increase in noise due to these open holes will not be noticeable from the ground.

(13) Anchor bolts. - At yearly intervals all anchor bolts, piping bolts, Dresser coupling bolts, pump assembly bolts, and all similar parts shall be checked for tightness and tightened if necessary.

(14) Draining water in pumping station. - If, due to the failure of the heating system in cold weather, it becomes necessary to drain all water in the building the following steps should be taken.

(a) Open drain valve at low point in water lines.

(b) Open gate valves and quick-opening valves in water supply lines at all engines.

(c) Open all petcocks on engines.

(d) Drain flexible water cooled exhausts on engines.

(e) Drain sanitary fixtures and open all traps.

(f) Drain boiler and heating system.

(15) Lubrication. - The two main requirements to keep equipment well lubricated are to operate equipment frequently, to spread a film of lubricant over the bearing surfaces, and secondly to use proper kinds and grades of good lubricants. As greases cake and harden in time, bearings should be disassembled periodically,

cleaned, and repacked with fresh grease. Cup greases should not be used on the equipment for any purpose because most cup greases have water as a binder. This moisture in contact with idle metal surfaces will corrode them in time.

The Keystone Velox No. 3 grease has been suggested by a pump manufacturer because it is a grease that is highly resistant to water and will not harden or cake in long lines. The grease selected for anti-friction bearings should be a special bearing grease designed to assure instantaneous lubricating activity and low starting and running torque.

The following is a tabulation of the types and grades of lubricants to be used on the equipment in the pumping station and the intervals between their application and change.

(a) Engines. - A good grade of automotive oil for crankcase use should be used having a viscosity as recommended by the engine manufacturer. Change oil and clean oil filters every six months - preferably just before pumping operations in the spring and again in fall.

After every thirty hours of operation a few drops of light bearing oil should be applied to the oil cups, and the grease cups turned down or refilled with a light pressure grease.

(b) Gear units. - A good grade of automotive oil should be used. Change oil and clean oil filters every two years.

(c) Propeller pumps. - The use of Keystone Velox No. 3 grease for the lower bearings of these pumps is recommended. Use a high pressure grease gun and apply after every ten hours of operation.

The Madison Kipp lubricators should be kept filled with an automotive oil, SAE - 20, and adjusted to feel approximately 10 drops a minute to the pump bearings.

(d) Volute pump. - The use of Keystone Velox No. 3 grease for the shaft packing gland on the pumps is recommended. The cups should be turned down a little after every few hours of operation and refilled when empty.

The grease cups on the pump bearings and the steady bearing should be filled with a light ball bearing grease. The grease cups on these bearings should be turned down, but only a little, after every thirty hours of operation. Anti-friction bearings will fail just as rapidly because of too much grease as from too little.

The two bearings on the volute pump and the steady bearing should be disassembled every three years, cleaned, and covered with a film of grease.

(e) Motor and generator bearings. - A good bearing oil, SAE - 20, should be used in the sleeve bearings of the

generator, the bearings of the volute pump motor, and the bearings of the small motors throughout the pumping station. The generator bearings and volute pump motor bearings should be drained, flushed out with kerosene, and refilled every two years.

(f) Electrically operated gate hoists. - Every three months the electrically operated hoists should be greased with a good pressure grease. Once a year the motor bearings should be greased with a light ball bearing grease. Care should be exercised in greasing the motor because an excess of grease is liable to run into the motor and damage the motor windings.

(g) Crane. - The grease fittings on the cranes should be lubricated once a year with a pressure grease.

(h) Sump pump. - Once a month grease all pump fittings with Keystone Velox No. 3 grease, using a high pressure grease gun.

(i) Flexible couplings. - The Falk couplings used between the pump engines and the gear units at Dwight Pumping Station and on the volute pump shafting at Call and Jones Ferry Pumping Stations take a medium weight fibrous grease. These pump engine couplings should be well packed with grease each time they are assembled.

(16) Manufacturers' drawings and recommendations. - The U. S. Engineer Office has furnished the City of Chicopee a complete set of manufacturers' drawings pertaining to the mechanical and electrical equipment in the pumping station and copies of factory acceptance tests on the equipment. These drawings should be kept in good condition and available for reference at all times. If, for any reason, the drawings become damaged or lost they should be replaced. The manufacturers will replace drawings for a nominal cost. The Operating and Maintenance Instructions of the engine manufacturers should be followed for gasoline engine care. There follows a list of manufacturers' publications which should be followed for operation and maintenance of other equipment.

(a) Generators. - Instructions GEH-709G Large Horizontal Motors and Generators - D.C. and Synchronous A.C. Machines.

Instructions GEH-67E Direct-Connected Exciters. General Electric Company.

Instruction Leaflet 2870 - Renewal Parts Data 3810. Westinghouse Electric & Manufacturing Company.

(b) Volute pumps. - Instructions for installation and operation - centrifugal pumps. Publication No. W-300-E1B.

Worthington Pump and Machinery Corporation.

(c) Switchboards. - Instruction Book for Installation, Operation and Maintenance of Switchboards.

Publication No. I.B. 5201-F.
Westinghouse Electric & Manufacturing Company.

(d) Storage batteries. - Instructions for installing and operating exide batteries - low gravity types in rubber.

The Electric Storage Battery Company,
Philadelphia, Pennsylvania

(e) Electrically operated gate hoists. - Installation and care of Chapman Motor Units. Setting and care of Chapman Limit Switches.

Chapman Valve Manufacturing Company,
Indian Orchard, Massachusetts.

8-03. OPERATION. - a. The following quotations from the regulations govern the operation of pumping stations:

"Competent operators shall be on duty at pumping plants whenever it appears that necessity for pump operation is imminent. The operator shall thoroughly inspect, trial operate, and place in readiness all plant equipment. The operator shall be familiar with the equipment manufacturer's instructions and drawings and with the "Operating Instructions" for each station. The equipment shall be operated in accordance with the above-mentioned "Operating Instructions" and care shall be exercised that proper lubrication is being supplied all equipment, and that no overheating, undue vibration or noise is occurring. Immediately upon final recession of flood waters, the pumping station shall be thoroughly cleaned, pump house sumps flushed and equipment thoroughly inspected, oiled and greased. A record or log of pumping plant operation shall be kept for each station, a copy of which shall be furnished the District Engineer following each flood."

b. The following instructions describe how to operate the equipment.

(1) Electric distribution. - The switchboards in pumping stations Nos. 2, 4, 5 and 6 control the distribution of electric energy throughout the pumping stations. A service switch is provided in the incoming power line as it enters the pumping station to permit the switchboard to be de-energized completely for maintenance and repair purposes. At pumping stations 1 and 3 electric energy is fed through a service switch to a lighting panelboard for distribution.

(2) Switchboards at pumping stations 4, 5 and 6. - (a). To energize the electric feeders throughout the pumping station, close the main circuit breaker marked "Incoming Line" and read the voltage of the incoming power line. The voltage may be read by

turning the voltmeter switch to each of the three positions on the side marked "Incoming Line". The voltage should be approximately 230 volts on each of the three phases. If these readings are obtained the circuit breakers on the right hand panel may be closed, thus energizing the various feeders throughout the pumping station. If a reading of approximately 230 volts is not obtained on each of the three phases an interruption of power from the Power Company's source is indicated and the gasoline-engine-driven generator must be used. To energize the switchboard from the generator the operator should open the main circuit breaker on the Incoming Power Line and close the main circuit breaker on the Generator Feeder. Both of these circuit breakers are interlocked so that one cannot be closed if the other is in a closed position.

(b) Voltage regulator. - The voltage regulators for the generators are the Westinghouse "Silverstat" and are mounted within the switchboard. The operation of them is automatic when properly adjusted. The voltage regulator operated upon changes of generator voltage to vary resistence in the exciter shunt field circuit thus holding the voltage of the generator constant. The large Exciter Field Rheostat on the switchboard has been set at the proper position for the operation of the voltage regulator and should be kept in this position. The proper position of the Exciter Field Rheostat is indicated by a mark on the front of the switchboard. Any adjustment of the generator voltage should always be made by the small knob on the switchboard marked "Voltage Adjusting Rheostat". This should be set so that the phase to phase voltage of the generator as indicated on the switchboard is 2[illegible] volts. If the voltage regulator fails to operate properly and does not hold the generator voltage constant then the following procedure may be used until the voltage regulator is repaired. Turn the Exciter Field Rheostat to the extreme "Lower" position; turn the Voltage Adjusting Rheostat in the extreme "Raise" position; then turn the Exciter Field Rheostat until the voltage of the generator is 230 volts. The voltage regulator is now out of operation and the generator voltage must be controlled manually by the Exciter Field Rheostat. Each time the load on the generator is changed the operator must readjust the Exciter Field Rheostat to hold the generator voltage at 230 volts.

(c) Battery charger. - Copper-oxide battery chargers are provided in each switchboard to maintain the engine storage batteries fully charged. To operate the battery charger the operator should first turn both of the battery-charging adjusting rheostats to the extreme low position - then close both circuit breakers on the switchboard in the battery charging circuit. The engine storage batteries are connected in parallel across the battery charger and a switch provided in the negative, or ungrounded wire at each engine. Any one of the engine batteries may be charged individually or all may be charged simultaneously by closing the individual switches at the engine bases. With these switches closed as required the battery-charging adjusting rheostats on the switchboard may be adjusted to the proper charging rate. These rheostats will vary the charging rate from 0 to the maximum capacity of the

rectifier. The charging rate should be adjusted so that no individual battery is being charged at a rate of over 15 amperes. Both the primary and the secondary of the battery chargers are protected by fuses located in the interior of the switchboard. If the battery charger fails to operate these fuses should first be checked for failure.

(3) Electrically driven 16-inch pumps. - (a) Before starting a 16-inch pump the operator should make sure that the pump is primed. This may be ascertained by opening the gate valve on top of the discharge section of the pump. If the pump is primed, water will flow out of this valve. If the pump is not primed the opening of this valve will allow all air in the pump to escape provided there is a head of water on the pump. When all air has been expelled from the pump and water flows from this valve, the valve may be closed and pump operation begun.

(b) The operation of the pump is controlled from the switchboard. To start the pump the circuit breaker feeding the pump controller should first be placed in the "ON" position. Then the pump may be started by turning the speed controller to the "OFF" position and pressing the "Start" button of the push-button station on the switchboard. The pump may be brought up to speed by turning the speed controller one notch at a time, allowing approximately five seconds to elapse between steps.

(c) In the event of a sustained overload on the pump a thermal trip in the switchboard will stop the motor. After the cause of the overload has been determined and corrective measures taken the "Reset" button on the switchboard should be momentarily depressed and then the motor may be started as instructed above.

(d) The stuffing box on the pump should be adjusted so that a small trickle of water leeks through all the time the pump is in operation. If the pump has been dry for a long period of time the stuffing box will leak considerably when the pump is first filled with water. However, since the packing expands when wet, care should be exercised when starting the pump after a long inoperative period to see that the stuffing box packing does not swell sufficiently to bind the pump shaft.

(e) The grease cups on the pump and steady bearing should be turned down a bit after every few hours of operation. Only a little grease should be fed to these bearings as too much grease is injurious to anti-friction bearings.

(f) The pump should never be operated for more than thirty seconds without water in it as the wearing rings in the pump are built with very close tolerances and depend on water for lubrication.

(4) Propeller pumps. - (a) Whenever the inflow to the station exceeds the capacity of the 16-inch pump, one or more of the 30-inch propeller pumps should be used. Water is admitted to the wet sump by opening the sluice gate on the intake to the propeller pump sump.

(b) If the pumps have been idle for a few weeks or more the pipe cap should be removed from the oil fill pipe that feeds the pump shaft cover pipe and about one-half pint of oil poured into the pipe. This oil fill pipe is located near the automatic lubricator on the pump base. The automatic lubricator furnishes lubrication to the pump bearings during operation and should be adjusted to feed at the rate of approximately 10 drops of oil a minute. The purpose of pouring some oil in the fill pipe prior to starting the pumps after a period of inoperation is to insure adequate lubrication of the pumps at the time of starting.

(c) The river stage at which pumping stations are to be placed in operation is shown on Plate VI of Appendix "D". This plate refers to other plates which give flood operation instructions.

SECTION IX

DRAWINGS AND SPECIFICATIONS

9-01. DRAWINGS AND SPECIFICATIONS. - Complete sets of contract plans and specifications were presented to the City of Chicopee when the various projects were completed and turned over to the City for maintenance and operation. The various projects were:

North of North End Bridge
Initial Fiscal Year 1939 Unit
Fiscal Year 1939 Unit
Fiscal Year 1940 Unit
Dike South Bank Chicopee River and Dwight Pumping Station.
Chicopee Town Line to High Ground
Plainfield Pumping Station
Bertha Avenue Pumping Station
Paderewski Pumping Station
Jones Ferry Pumping Station
Call Street Pumping Station

APPENDIX "A"

TITLE 33—NAVIGATION AND NAVIGABLE WATERS

Chapter II—Corps of Engineers, War Department

PART 208—FLOOD CONTROL REGULATIONS

MAINTENANCE AND OPERATION OF FLOOD CONTROL WORKS

Pursuant to the provisions of section 3 of the Act of Congress approved June 22, 1936, as amended and supplemented (49 Stat. 1571; 50 Stat. 877; and 55 Stat. 638; 33 U. S. C. 701c; 701c–1), the following regulations are hereby prescribed to govern the maintenance and operation of flood control works:

§ 208.10 *Local flood protection works; maintenance and operation of structures and facilities*—(a) *General.* (1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits.

(2) The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with regulations prescribed by the Secretary of War, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the "Superintendent," who shall be responsible for the development and maintenance of, and directly in charge of, an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during periods of low water, all without cost to the United States.

(3) A reserve supply of materials needed during a flood emergency shall be kept on hand at all times.

(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the rights-of-way for the protective facilities.

(5) No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District Engineer of the War Department or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work.

(6) It shall be the duty of the superintendent to submit a semiannual report to the District Engineer covering inspection, maintenance, and operation of the protective works.

(7) The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works.

(8) Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made.

(9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods.

(10) The War Department will furnish local interests with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in carrying out their obligations under these regulations.

(b) *Levees*—(1) *Maintenance.* The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood. Measures shall be taken to promote the growth of sod, exterminate burrowing animals, and to provide for routine mowing of the grass and weeds, removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces. Where practicable, measures shall be taken to retard bank erosion by planting of willows or other suitable growth on areas riverward of the levees. Periodic inspections shall be made by the Superintendent to insure that the above maintenance measures are being effectively carried out and, further, to be certain that:

(i) No unusual settlement, sloughing, or material loss of grade or levee cross section has taken place;

(ii) No caving has occurred on either the land side or the river side of the levee which might affect the stability of the levee section;

(iii) No seepage, saturated areas, or sand boils are occurring;

(iv) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged;

(v) Drains through the levees and gates on said drains are in good working condition;

(vi) No revetment work or riprap has been displaced, washed out, or removed;

(vii) No action is being taken, such as burning grass and weeds during inappropriate seasons, which will retard or destroy the growth of sod;

(viii) Access roads to and on the levee are being properly maintained;

(ix) Cattle guards and gates are in good condition;

(x) Crown of levee is shaped so as to drain readily, and roadway thereon, if any, is well shaped and maintained;

(xi) There is no unauthorized grazing or vehicular traffic on the levees;

(xii) Encroachments are not being made on the levee right-of-way which might endanger the structure or hinder its proper and efficient functioning durin times of emergency.

Such inspections shall be made immediately prior to the beginning of the flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days; and such intermediate times as may be necessary to insure the best possible care of the levee. Immediate steps will be taken to correct dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent.

(2) *Operation.* During flood periods the levee shall be patrolled continuously to locate possible sand boils or unusual wetness of the landward slope and to be certain that:

(i) There are no indications of slides or sloughs developing;

(ii) Wave wash or scouring action is not occurring;

(iii) No low reaches of levee exist which may be overtopped;

(iv) No other conditions exist which might endanger the structure.

Appropriate advance measures will be taken to insure the availability of adequate labor and materials to meet all contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section.

(c) *Flood walls.*—(1) *Maintenance.* Periodic inspections shall be made by the Superintendent to be certain that:

(i) No seepage, saturated areas, or sand boils are occurring;

(ii) No undue settlement has occurred which affects the stability of the wall or its water tightness;

(iii) No trees exist, the roots of which might extend under the wall and offer accelerated seepage paths;

(iv) The concrete has not undergone cracking, chipping, or breaking to an extent which might affect the stability of the wall or its water tightness;

(v) There are no encroachments upon the right-of-way which might endanger the structure or hinder its functioning in time of flood;

(vi) Care is being exercised to prevent accumulation of trash and debris adjacent to walls, and to insure that no fires are being built near them;

(vii) No bank caving conditions exist riverward of the wall which might endanger its stability;

(viii) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged.

Such inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days. Measures to eliminate encroachments and effect repairs found necessary by such inspections shall be undertaken immediately. All repairs shall be accomplished by methods acceptable in standard engineering practice.

(2) *Operation.* Continuous patrol of the wall shall be maintained during flood periods to locate possible leakage at monolith joints or seepage underneath the wall. Floating plant or boats will not be allowed to lie against or tie up to the wall. Should it become necessary during a flood emergency to pass anchor cables over the wall, adequate measures shall be taken to protect the concrete and construction joints. Immediate steps shall be taken to correct any condition which endangers the stability of the wall.

(d) *Drainage structures*—(1) *Maintenance.* Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash, drift, or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on

drainage structures shall be examined, oiled, and trial operated at least once every 90 days. Where drainage structures are provided with stop log or other emergency closures, the condition of the equipment and its housing shall be inspected regularly and a trial installation of the emergency closure shall be made at least once each year. Periodic inspections shall be made by the Superintendent to be certain that:

(i) Pipes, gates, operating mechanism, riprap, and headwalls are in good condition;

(ii) Inlet and outlet channels are open;

(iii) Care is being exercised to prevent the accumulation of trash and debris near the structures and that no fires are being built near bituminous coated pipes;

(iv) Erosion is not occurring adjacent to the structure which might endanger its water tightness or stability.

Immediate steps will be taken to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspections.

(2) *Operation.* Whenever high water conditions impend, all gates will be inspected a short time before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates shall be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves shall be closed as necessary to prevent inflow of flood water. All drainage structures in levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse condition.

(e) *Closure structures*—(1) *Maintenance.* Closure structures for traffic openings shall be inspected by the superintendent every 90 days to be certain that:

(i) No parts are missing;

(ii) Metal parts are adequately covered with paint;

(iii) All movable parts are in satisfactory working order,

(iv) Proper closure can be made promptly when necessary;

(v) Sufficient materials are on hand for the erection of sand bag closures and that the location of such materials will be readily accessible in times of emergency.

Tools and parts shall not be removed for other use. Trial erections of one or more closure structures shall be made once each year, alternating the structures chosen so that each gate will be erected at least once in each 3-year period. Trial erection of all closure structures shall be made whenever a change is made in key operating personnel. Where railroad operation makes trial erection of a closure structure infeasible, rigorous inspection and drill of operating personnel may be substituted therefor. Trial erection of sand bag closures is not required. Closure materials will be carefully checked prior to and following flood periods, and damaged or missing parts shall be repaired or replaced immediately.

(2) *Operation.* Erection of each movable closure shall be started in sufficient time to permit completion before flood waters reach the top of the structure sill. Information regarding the proper method of erecting each individual closure structure, together with an estimate of the time required by an experienced crew to complete its erection will be given in the Operation and Maintenance Manual which will be furnished local interests upon completion of the project. Closure structures will be inspected frequently during flood periods to ascertain that no undue leakage is occurring and that drains provided to care for ordinary leakage are functioning properly. Boats or floating plant shall not be allowed to tie up to closure structures or to discharge passengers or cargo over them.

(f) *Pumping plants*—(1) *Maintenance.* Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be taken to provide for cleaning plant, buildings, and equipment, repainting as necessary, and lubricating all machinery Adequate supplies of lubricants for all types of machines, fuel for gasoline or diesel powered equipment, and flash lights or lanterns for emergency lighting shall be kept on hand at all times. Telephone service shall be maintained at pumping plants. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subjected to undue dampness and otherwise at intervals not to exceed one year. A record shall be kept showing the results of such tests. Wiring disclosed to be in an unsatisfactory condition by such tests shall be brought to a satisfactory condition or shall be promptly replaced. Diesel and gasoline engines shall be started at such intervals and allowed to run for such length of time as may be necessary to insure their serviceability in times of emergency. Only skilled electricians and mechanics shall be employed on tests and repairs. Operating personnel for the plant shall be present during tests. Any equipment removed from the station for repair or replacement shall be returned or replaced as soon as practicable and shall be trial operated after reinstallation. Repairs requiring removal of equipment from the plant shall be made during off-flood seasons insofar as practicable.

(2) *Operation.* Competent operators shall be on duty at pumping plants whenever it appears that necessity for pump operation is imminent. The operator shall thoroughly inspect, trial operate, and place in readiness all plant equipment. The operator shall be familiar with the equipment manufacturers' instructions and drawings and with the "Operating Instructions" for each station. The equipment shall be operated in accordance with the above-mentioned "Operating Instructions" and care shall be exercised that proper lubrication is being supplied all equipment, and that no overheating, undue vibration or noise is occurring. Immediately upon final recession of flood waters, the pumping station shall be thoroughly cleaned, pump house sumps flushed, and equipment thoroughly inspected, oiled and greased. A record or log of pumping plant operation shall be kept for each station, a copy of which shall be furnished the District Engineer following each flood.

(g) *Channels and floodways* — (1) *Maintenance.* Periodic inspections of improved channels and floodways shall be made by the Superintendent to be certain that:

(i) The channel or floodway is clear of debris, weeds, and wild growth;

(ii) The channel or floodway is not being restricted by the depositing of waste materials, building of unauthorized structures or other encroachments;

(iii) The capacity of the channel or floodway is not being reduced by the formation of shoals;

(iv) Banks are not being damaged by rain or wave wash, and that no sloughing of banks has occurred;

(v) Riprap sections and deflection dikes and walls are in good condition;

(vi) Approach and egress channels adjacent to the improved channel or floodway are sufficiently clear of obstructions and debris to permit proper functioning of the project works.

Such inspections shall be made prior to the beginning of the flood season and otherwise at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections. Measures will be taken by the Superintendent to promote the growth of grass on bank slopes and earth deflection dikes. The Superintendent shall provide for periodic repair and cleaning of debris basins, check dams, and related structures as may be necessary.

(2) *Operation.* Both banks of the channel shall be patrolled during periods of high water, and measures shall be taken to protect those reaches being attacked by the current or by wave wash. Appropriate measures shall be taken to prevent the formation of jams of ice or debris. Large objects which become lodged against the bank shall be removed. The improved channel or floodway shall be thoroughly inspected immediately following each major high water period. As soon as practicable thereafter, all snags and other debris shall be removed and all damage to banks, riprap, deflection dikes and walls, drainage outlets, or other flood control structures repaired.

(h) *Miscellaneous facilities* — (1) *Maintenance.* Miscellaneous structures and facilities constructed as a part of the protective works and other structures and facilities which function as a part of, or affect the efficient functioning of the protective works, shall be periodically inspected by the Superintendent and appropriate maintenance measures taken. Damaged or unserviceable parts shall be repaired or replaced without delay. Areas used for ponding in connection with pumping plants or for temporary storage of interior run-off during flood periods shall not be allowed to become filled with silt, debris, or dumped material. The Superintendent shall take proper steps to prevent restriction of bridge openings and, where practicable, shall provide for temporary raising during floods of bridges which restrict channel capacities during high flows.

(2) *Operation.* Miscellaneous facilities shall be operated to prevent or reduce flooding during periods of high water. Those facilities constructed as a part of the protective works shall not be used for purposes other than flood protection without approval of the District Engineer unless designed therefor. (49 Stat. 1571, 50 Stat. 877; and 55 Stat. 638; 33 U.S.C. 701c; 701c–1) (Regs. 9 August 1944, CE SPEWF)

[SEAL] J. A. ULIO,
Major General,
The Adjutant General.

[F. R. Doc. 44–12285; Filed, August 16, 1944; 9:44 a. m.]

APPENDIX "B"

PAGE

ASSURANCE OF LOCAL COOPERATION

C O P Y

ASSURANCES BY THE CITY OF CHICOPEE, MASSACHUSETTS

WHEREAS, pursuant to the provisions of the Emergency Relief Appropriation Act of 1936, approved June 22, 1936, making an appropriation for flood control and other conservation, an allotment of funds has been approved by the President, August 12, 1936, for raising and enlarging existing dikes in the Connecticut iver for the flood protection of the City of Chicopee, Hampden County, Massachusetts; and

WHEREAS, the United States of America, through the Corps of Engineers of the War Department, having jurisdiction of construction of said flood control project, and in accordance with the policy of the federal government that no money shall be expended on the construction of any project until States, political sub-division thereof, or other responsible local agencies have given assurances satisfactory to the Secretary of War that they will (a) provide without cost to the United States all lands, easements, and rights-of-way necessary for the construction of the project, except as otherwise provided herein; (b) hold and save the United States free from damages due to the construction works; (c) maintain and operate all the works after completion in accordance with regulations prescribed by the Secretary of War; and

WHEREAS, the Board of Aldermen of the City of Chicopee by virtue of the authority vested in it under Charter of the City of Chicopee has duly passed a Resolution at a meeting held on September 21, 1936, authorizing the City of Chicopee to accept the offer of the United States of America to construct certain works of improvement for flood protection of the City of Chicopee, Massachusetts,

has authorized the Mayor and the City Treasurer of the City of Chicopee to enter into such agreements with the United States as it may request as evidence of the City's formal acceptance.

NOW, THEREFORE, in order to comply with the established policy of the federal government pertaining to the construction of flood control projects, and in consideration of the construction by the United States, and of the benefits to accrue from the work of improvement, The City of Chicopee hereby assures the Secretary of War as follows:

(a) That the City of Chicopee will furnish, without cost to the United States, all lands, easements and rights-of-way, necessary for the raising and enlarging existing dikes, if any, along the Connecticut River for flood protection of the City of Chicopee. The lands, easements and rights-of-way which the City of Chicopee shall furnish shall include those needed for raising and enlarging dikes, for borrow pits and spoil disposal areas, for access roads, and all other rights in, upon, through or over private property which are required by the United States in connection with the construction of the project. Maps showing the lands, easements, or rights-of-way needed in the prosecution of the work will be obtained by the City of Chicopee from the United States. Detailed property surveys and title searched necessary to acquire the land or interests therein will be performed by the City of Chicopee.

(b) That the City of Chicopee will hold and save the United States, its officers and employees, free from all claims for damages and from all liability due to the construction works;

(c) That the City of Chicopee will maintain and operate without expense to the United States all of the works after completion, in accordance with regulations prescribed by the Secretary of War.

(d) That it is understood by the City of Chicopee that the United States is not committed or obligated in any way to complete said flood control work or any part thereof.

IN WITNESS WHEREOF, we, ANTHONY J. STONINA, Mayor, and LOUIS M. DUFAULT, City Treasurer, under authority of the Board of Aldermen of the City of Chicopee, have hereunto set our hands and caused the common seal of The City of Chicopee to be affixed hereto this 24th day of September, A.D. 1936.

ATTEST

Charles LaRurer /s/

SEAL

CITY OF CHICOPEE

BY /s/ Anthony J. Stonina
Mayor.

BY Louis M. Dufault /s/
City Treasurer.

Recommended as satisfactory assurances.

EDWARD M. MARKHAM,
Major General, Chief of
Engineers
United States Army.

Accepted as satisfactory assurances.

C O P Y

'TATE OF MASSACHUSETTS,)
)
COUNTY OF HAMPDEN)

On this 24th day of September in the year one thousand nine hundred and thirty six, before me personnaly came ANTHONY J. STONINA, Mayor and LOUIS M. DUFAULT, City Treasurer to me known, who being by me duly sworn, did depose and say that they reside in Chicopee, Massachusetts; that they are Mayor and City Treasurer of The City of Chicopee, Massachusetts, described in and who executed the foregoing instrument; that they know the common seal of the City of Chicopee, that the seal affixed to said instrument is such City seal; that it was so affixed by authority of law of said City, and that they signed their names thereto by like authority.

My commission expires
Sept 12, 1941

/s/ Stanley F. Closek
Notary Public

C O P Y

ASSURANCES BY THE CITY OF CHICOPEE, MASSACHUSETTS, TO THE UNITED STATES OF AMERICA.

WHEREAS, the United States of America, through the Corps of Engineers of the War Department, having jurisdiction of construction of flood control project, and in accordance with the policy of the federal government (a) provide without cost to the United States all land, easements, entries and rights of way necessary for the construction of the project, except as otherwise provided herein: (b) hold and save the United States free from damages due to the construction works; (c) maintain and operate all the works after completion in accordance with regulations prescribed by the Secretary of War;

NOW, THEREFORE, in order to comply with the established policy of the federal government pertaining to the construction of flood control projects, and in consideration of the construction by the United States, and of the benefits to accrue from the work of improvement, the City of Chicopee hereby assures the Secretary of War;

That the City of Chicopee will furnish, without cost to the United States, all lands, easements, entries and rights of way necessary for the construction of said dikes for flood protection of the City of Chicopee. The lands, easements, entries and rights of way which the City of Chicopee shall furnish shall include those needed, including access roads, and all other rights in, upon, through or over private property which are required by the United States in connection with the construction of the project.

That the City of Chicopee will maintain and operate without expense to the United States all of the works after completion, in accordance with regulations prescribed by the Secretary of War.

That the City of Chicopee will hold and save the United States, its officers and employees, free from all claims for damages and from all liability due to the construction works.

That the City of Chicopee does and hereby gives the United States, its officers and employees the right of entry, the right to demolish the old Dam site, formerly of the Ames Sword Company and now owned by the City of Chicopee, the right to use such materials and stone in the old Dam for the construction of a stone dike on the southerly bank from a point at old bulkhead, normal to Dam site beginning at old gate bulkhead and tying to southerly shore, approximately one hundred (100) feet easterly, and a further right to make such fill as is necessary to provide suitable foundation for this stone dike up to the normal bank elevation:

WHEREAS, the Board of Aldermen of the City of Chicopee by virtue of the authority vested in it under Charter of The City of Chicopee has duly passed a Resolution at a meeting held on November 1, 1938, authorizing the City of Chicopee to accept the offer of the United States of America to construct certain works of improvement for flood protection of the City of Chicopee, Massachusetts, has authorized the Mayor and the City Treasurer of the City of Chicopee to enter

into such agreements with the United States as it may request as evidence of the City's formal acceptance.

Title to said property is vested in the City of Chicopee by virtue of the Quit Claim Deed from the Ames Sword Company to the City of Chicopee, said deed to be Document No. 13817 and recorded in the Hampden Registry of Deeds.

IN WITNESS WHEREOF, we, ANTHONY J. STONINA, Mayor, and LOUIS M. DUFAULT, City Treasurer, under authority of the Board of Aldermen of The City of Chicopee, have hereunto set our hands and cause the common seal of The City of Chicopee to be affixed hereto this second day of November 1938.

CITY OF CHICOPEE.

CITY SEAL

By /s/ Anthony J. Stonina

By /s/ Louis M. Dufault

Recommended as satisfactory assurances.

_____

Accepted as satisfactory assurances.

_____
Secretary of War.

STATE OF MASSACHUSETTS,)
)
COUNTY OF HAMPDEN)

On this second day of November in the year one thousand nine hundred and thirty eight, before me personally came ANTHONY J. STONINA, Mayor and LOUIS M. DUFAULT, City Treasurer to me known, who being by me duly sworn, did depose and say that they reside in Chicopee, Massachusetts; that they are Mayor and City Treasurer of the City of Chicopee, Massachusetts, described in and who executed the foregoing instrument; that they know the common seal of The City of Chicopee, that the seal affixed to said instrument is such City seal; that it was so affixed by authority of law of said City, and that they signed their names thereto by like authority.

My commission expires
September 12, 1941.

/s/ Stanley F. Closek
Notary Public

NOTARY SEAL

B-6

APPENDIX "C"

PAGE

INSPECTION REPORT FORMS

INSPECTION REPORT
FOR
FLOOD PROTECTION SYSTEM, CHICOPEE, MASS.

Dike Inspection Report (Part 1) Date _____

	Location (From Sta. to Sta.)	Description
a. Grass or sod:		
b. Damage due to fire:		
c. Rain, wave, current wash or caving banks:		
d. Damage due to rodents:		
e. Damage due to livestock:		
f. Sand boil areas marked:		

INSPECTION REPORT
FOR
FLOOD PROTECTION SYSTEM, CHICOPEE, MASS.

Dike Inspection Report (Part 2) Date _____

	Location (From Sta. To Sta.)	(Description)
g. Trespassing on Right-of-way:		
h. Damage to toe drains:		
i. Damage to Riprap:		
j. Damage to Dike Crown:		

Check items if found satisfactory.

If everything is not in order, explain below:

_____

_____

_____

Inspected by: _____

INSPECTION REPORT
FOR
FLOOD PROTECTION SYSTEM, CHICOPEE, MASS.

Concrete Wall Inspection Report Date: _____

a. Monolith joints

(1) Expansion material _____

(2) Concrete at joints _____

b. Wall

(1) Cracks _____

(2) Settlement _____

(3) Caving of banks _____

(4) Bank protection _____

(5) Toe drains _____

c. Trespassing on right-of-way

(1) Excavation _____

(2) Depositing materials _____

(3) Construction _____

(4) Fires _____

Check items if found satisfactory.

If everything is not in order, explain below:

_____

_____

_____

Inspected by: _____

INSPECTION REPORT
FOR
FLOOD PROTECTION SYSTEM, CHICOPEE, MASS.

Drainage Structure Inspection Report Date _____

	Location	Condition
a. Valves or gates:	_____	_____
	_____	_____
	_____	_____
b. Pipe:	_____	_____
	_____	_____
	_____	_____
c. Headwalls:	_____	_____
	_____	_____
	_____	_____
d. Riprap:	_____	_____
	_____	_____
	_____	_____
e. Catch Basins:	_____	_____
	_____	_____
	_____	_____
f. Stone Gutters:	_____	_____
	_____	_____
	_____	_____

Check items if found satisfactory.

If everything is not in order, explain below:

_____

_____

Inspected by _____

INSPECTION REPORT
FOR
FLOOD PROTECTION SYSTEM, CHICOPEE, MASS.

Closure Structure Inspection Report. Date _____

	Stop-log Closure		
	No. 1	No. 2	No. 3
a. Concrete:			
b. Metal Parts:			
c. Timbers:			
d. Repairs Needed:			
e. Parts Needing Paint:			
f. Date of Last Trial Erection			
g. Sand Bags Available:			

Check items if found satisfactory.

If everything is not in order, explain below:

_____

_____

_____

Inspected by: _____

INSPECTION REPORT
FOR
FLOOD PROTECTION SYSTEM, CHICOPEE, MASS.

Pumping Station Inspection Report. Date _____

	Yes	No
a. Have all engines been operated weekly as per instructions	---	---
b. Have all gear units been operated monthly as per instructions	---	---
c. Have pumps been inspected yearly as per instructions	---	---
d. Have all batteries been kept properly charged	---	---
e. Has oil been changed in engines every six months	---	---
f. Have cooling systems of radiator cooled engines been flushed out yearly	---	---
g. Have insulation resistance tests been run on all electrical equipment and circuits	---	---
h. Have insulation resistance values shown any appreciable decrease since last tests. If so note below	---	---
i. Have gates and valves been operated as directed	---	---
j. Have all heating systems been utilized in winter months	---	---
k. Have all heating and plumbing facilities functioned satisfactorily	---	---
l. Have buildings shown any signs of settlement or deterioriation	---	---

m. If everything is not in order explain below .....
.....
.....

Inspected by: _____

APPENDIX "D"

DRAWINGS

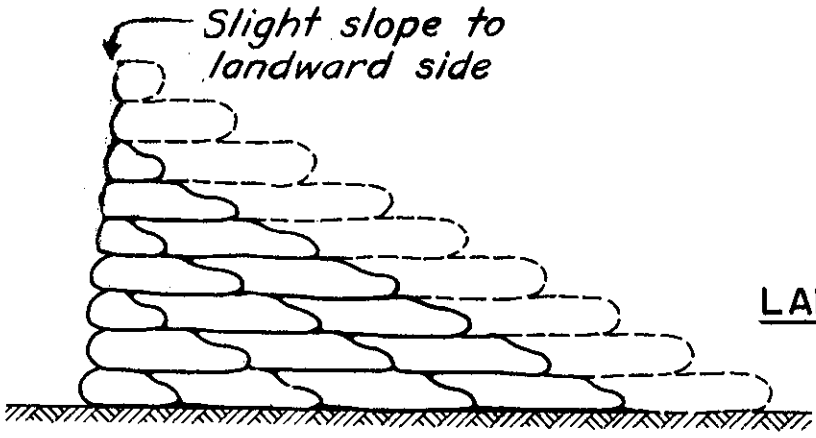
	PLATE
STANDARD HIGHWATER MAINTENANCE METHODS	
Sack Dike or Topping	I
Sack Dike or Topping	IA
Lumber and Sack Topping	II
Sand Boil	III
Effect of Sand Boils on Levee	IIIA
Sacking Sloughs	IV
Emergency Flashboards	V
OPERATIONS	
Schedule of Operations	VI
PLANS AND PROFILES	
Location Map	VII
Initial Fiscal Year 1939 Unit	VIII to X
Fiscal Year 1939 Section	XI to XXII
Dike South Bank Chicopee River and Dwight Pumping Station	XXIII to XXXIV
Fiscal Year 1940 Unit	XXXV to XXXVII
North of North End Bridge	XXXVIII
Chicopee Town Line to High Ground	XXXIX to XL
Plainfield Pumping Station	XLI & XLII
Bertha Avenue Pumping Station	XLIII to XLV
Paderewski Pumping Station	XLVI to XLVIII
Jones Ferry Pumping Station	XLIX to LII
Call Street Pumping Station	LIII to LV
Soil Profiles	LVI to LXIII

BENCH MARKS

Listed below are descriptions of two U. S. Coast and Geodetic Survey bench marks. The elevations shown are on mean sea level datum and are first-order leveling.

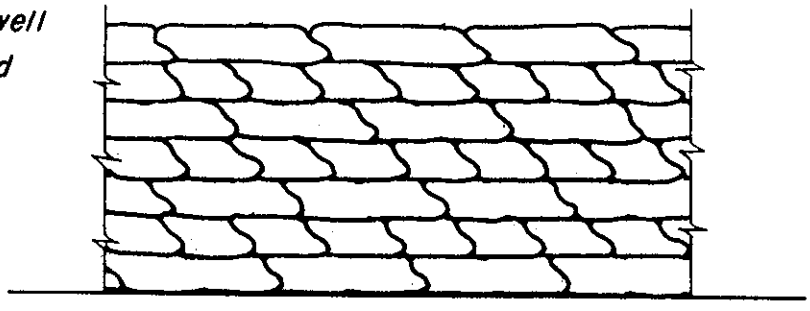
1. At Brightwood, about 111 feet north of the Boston and Main Railroad Station Platform, about 65 feet south of the center line of Wason Avenue, 11.8 feet West of the most westerly rail and 1.4 feet West of the west edge of a brick walk leading from Wason Avenue to the station. A standard disk, set in the top of a concrete post. Elevation 61.591 feet.

2. About 100 yards south of the railroad station, at the Southeast corner of the base of Semaphore No. 32. The top of an iron bolt. Elevation 81.332 feet.



SECTION

Note: Sacks should be lapped at least 1/3 all ways and well mauled or tamped into place.



RIVERSIDE ELEVATION

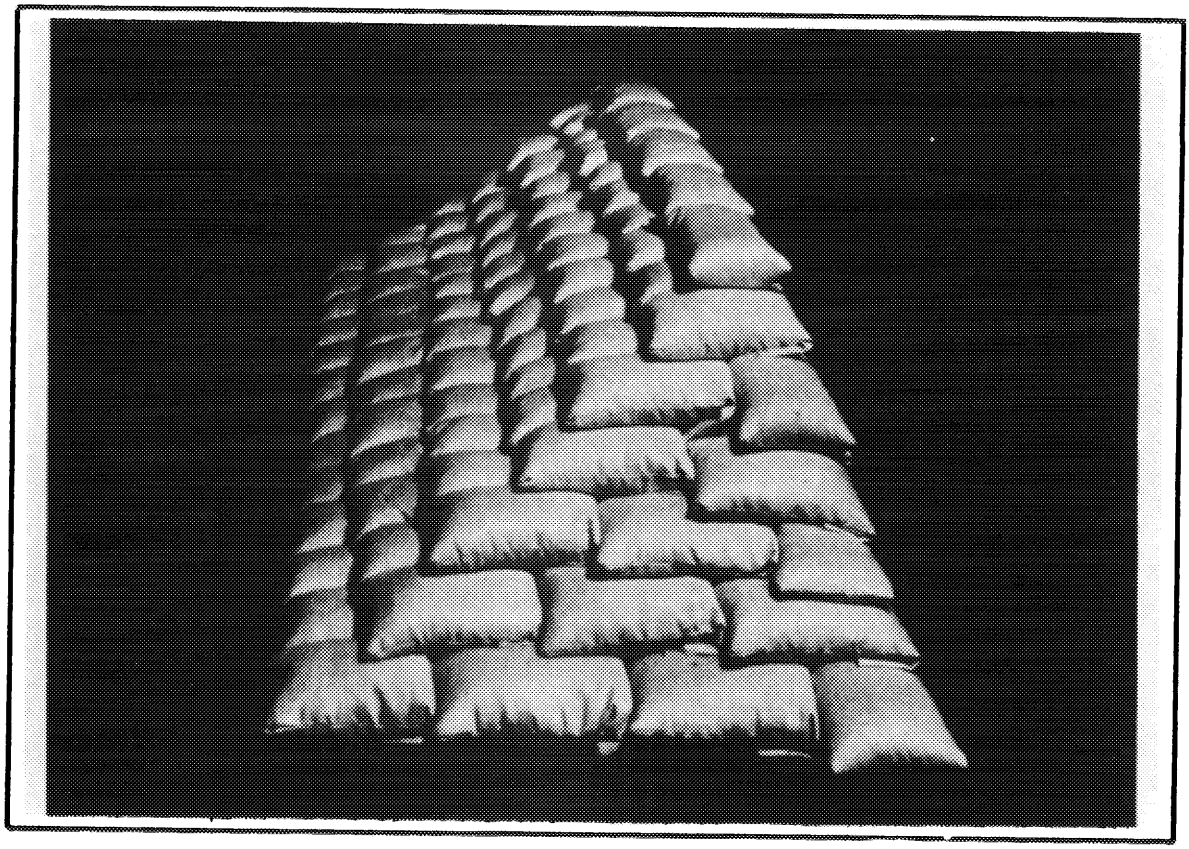
SACKS REQUIRED PER 100' STA.
100 lb. "Feed" Sacks - 1 Cu. Ft. Each

Approx. Hgt. Sack Dike	Sacks High	Required
1.5	3	300
2.0	4	750
3.0	6	1400
4.0	8	2250
5.0	10	3250
6.0	12	4500
7.0	14	5950
8.0	16	7600

SACK DIKE OR TOPPING STANDARD HIGH WATER MAINTENANCE INSTRUCTION

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.

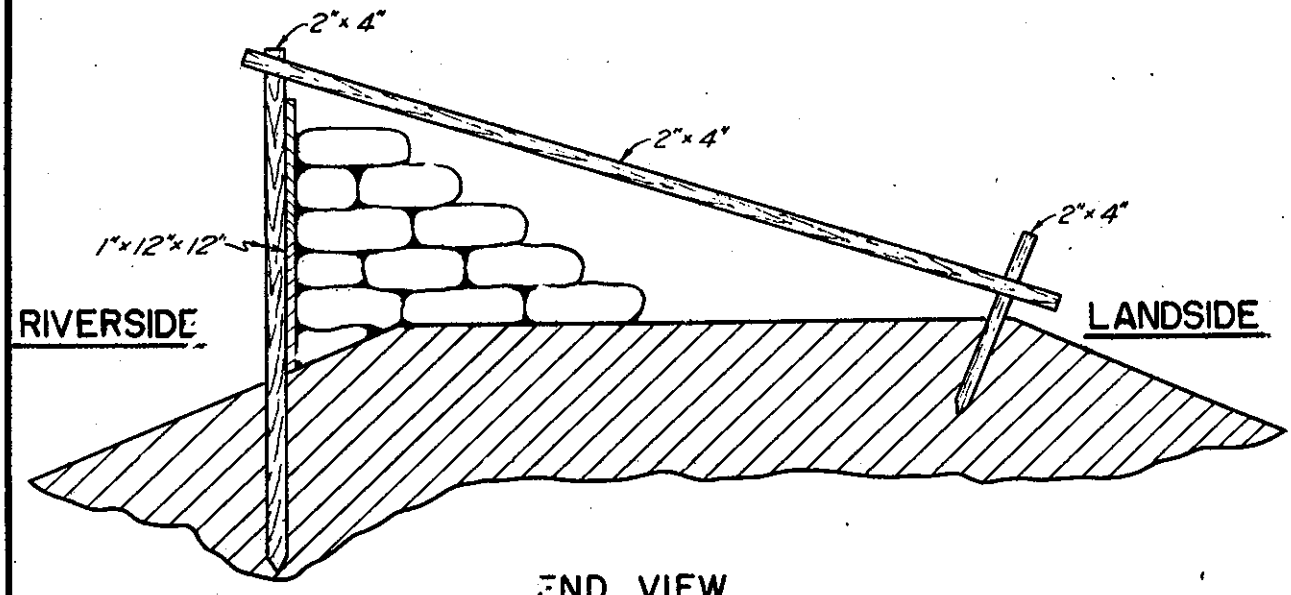
Plate I



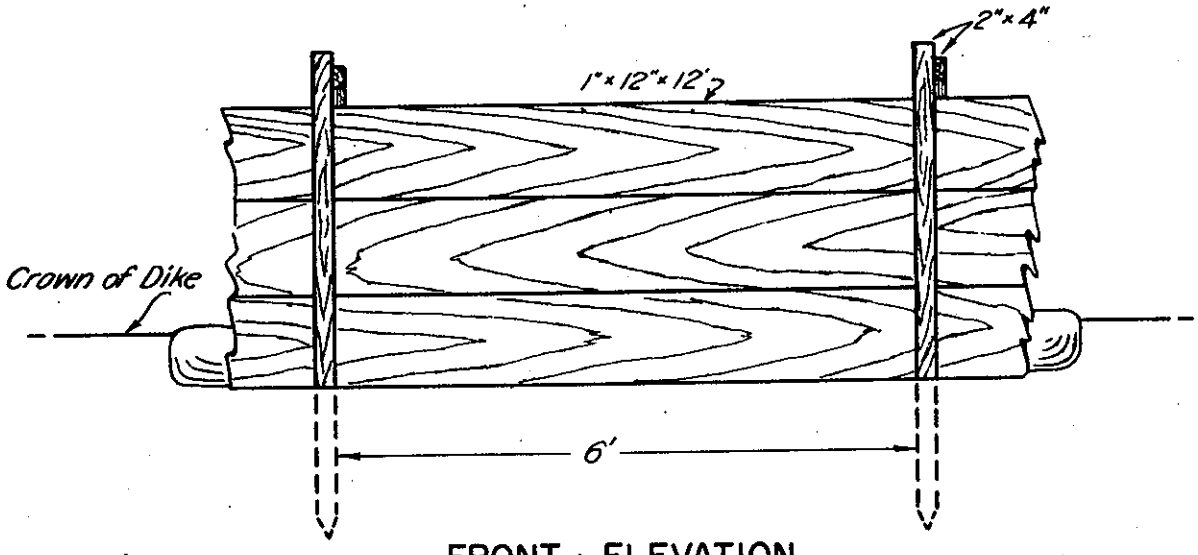
MODEL SACK DIKE OR TOPPING
Typical Section

MODEL SACK DIKE OR TOPPING
Riverside View

PLATE 1A



END VIEW



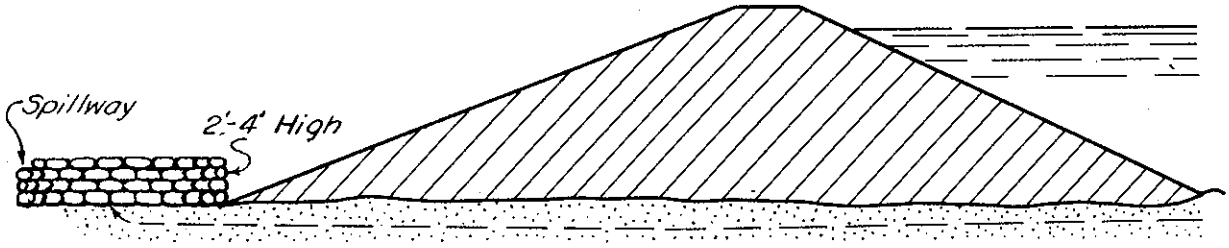
FRONT ELEVATION

BILL OF MATERIAL TO CONSTRUCT 100 FEET

25 pcs. 1"x12"x12'	17 pcs. 2"x4"x6'
17 pcs. 2"x4"x10'	17 pcs. 2"x4"x2'

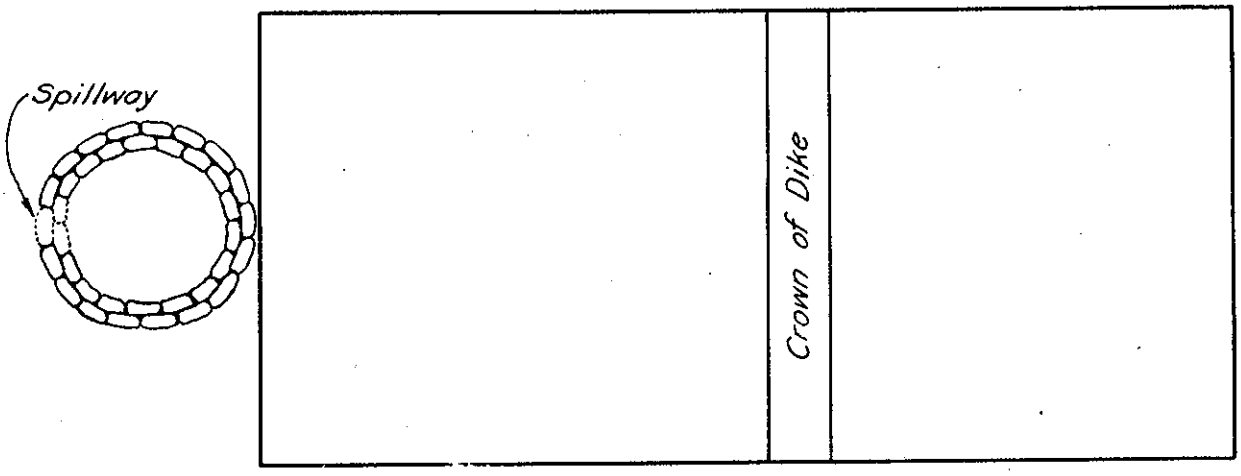
LUMBER AND SACK TOPPING
STANDARD HIGH WATER
MAINTENANCE INSTRUCTION

U. S. ENGINEER OFFICE, PROVIDENCE, R.I.



ELEVATION

Wall should be built on firm foundation, with width of base at least 1½ times the height. Be sure to place sacks on ground clear of sand discharge. Tie into dike if boil is near toe.



PLAN

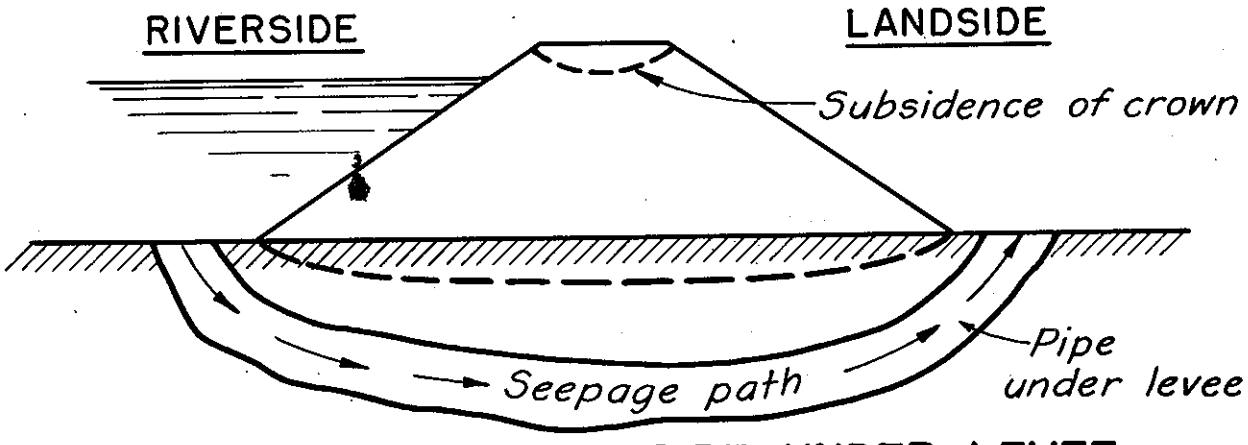
Do not sack boil which does not put out material. Height of sack loop or ring should be only sufficient to create enough head to slow down flow through boil so that no more material is displaced and boil runs clear. Do not try to stop fully, flow through boil.

SAND BOIL STANDARD HIGH WATER MAINTENANCE INSTRUCTION

U. S. ENGINEER OFFICE, PROVIDENCE, R.I.

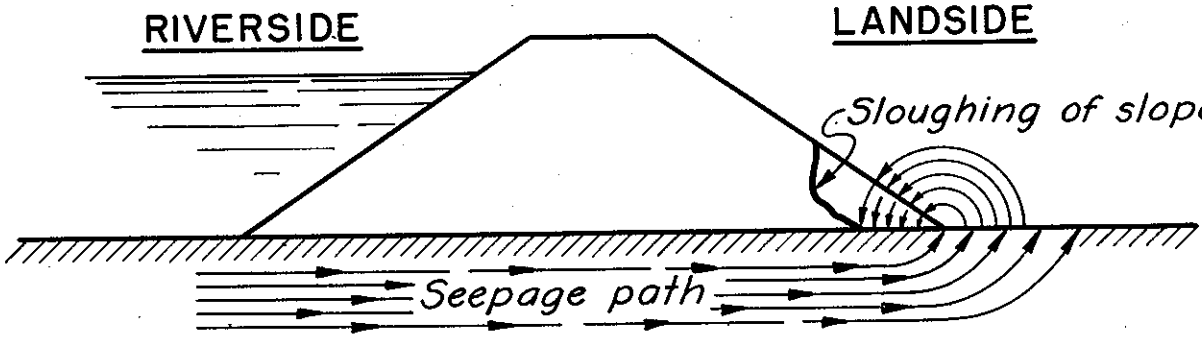
Plate III

EFFECTS OF SAND BOILS ON LEVEE



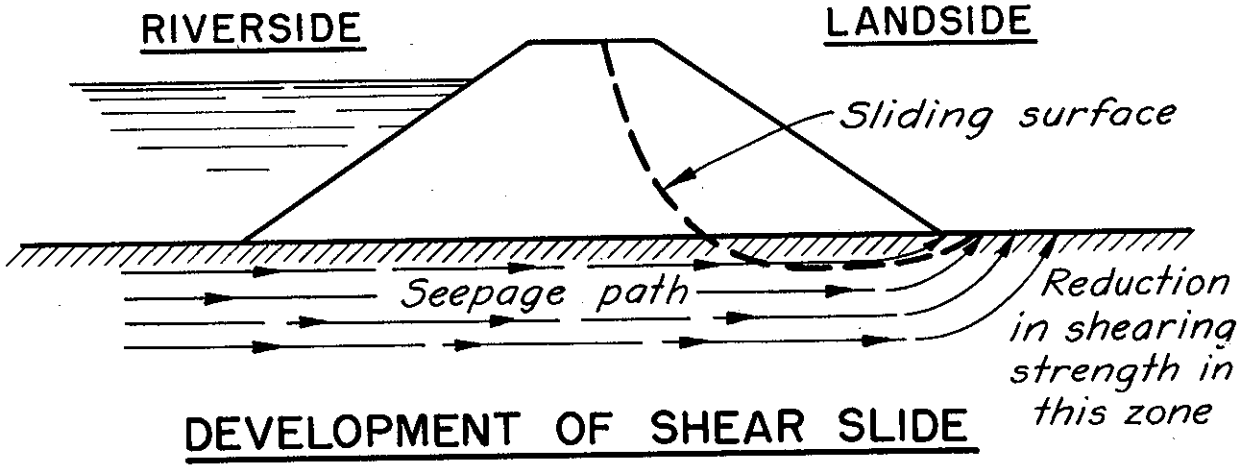
DEVELOPMENT OF PIPE UNDER LEVEE

Fig. 1



SLOUGHING OF LANDSLIDE SLOPE DUE TO RAVELLING AND UNDERCUTTING OF TOE

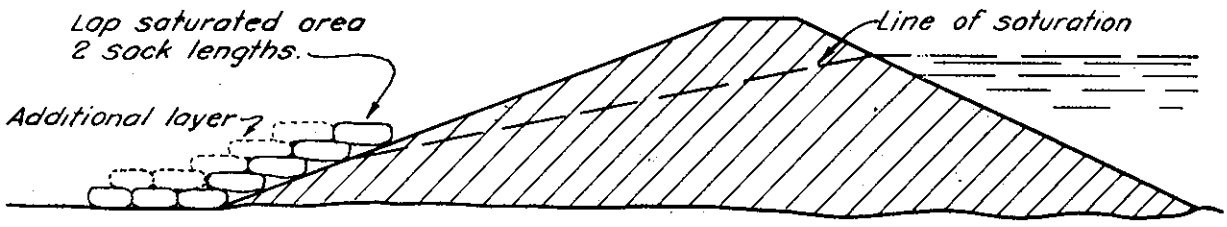
Fig. 2



DEVELOPMENT OF SHEAR SLIDE

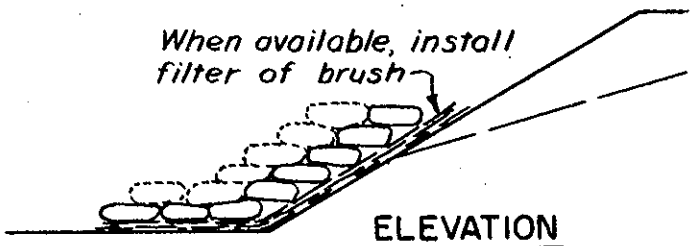
Fig. 3

PLATE III A

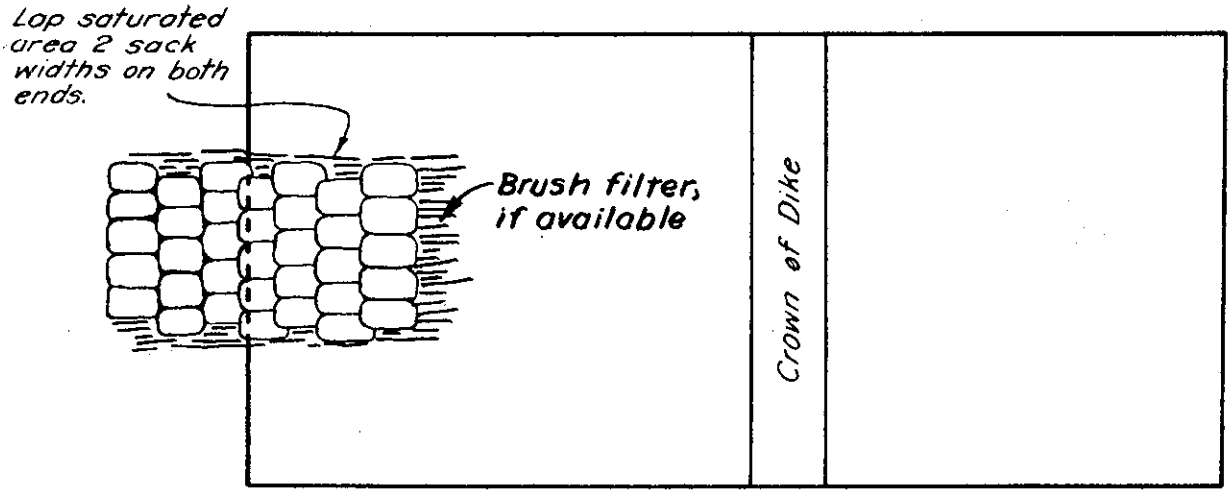


ELEVATION

Number of layers determined by velocity of seepage and amount of material being carried.



ELEVATION

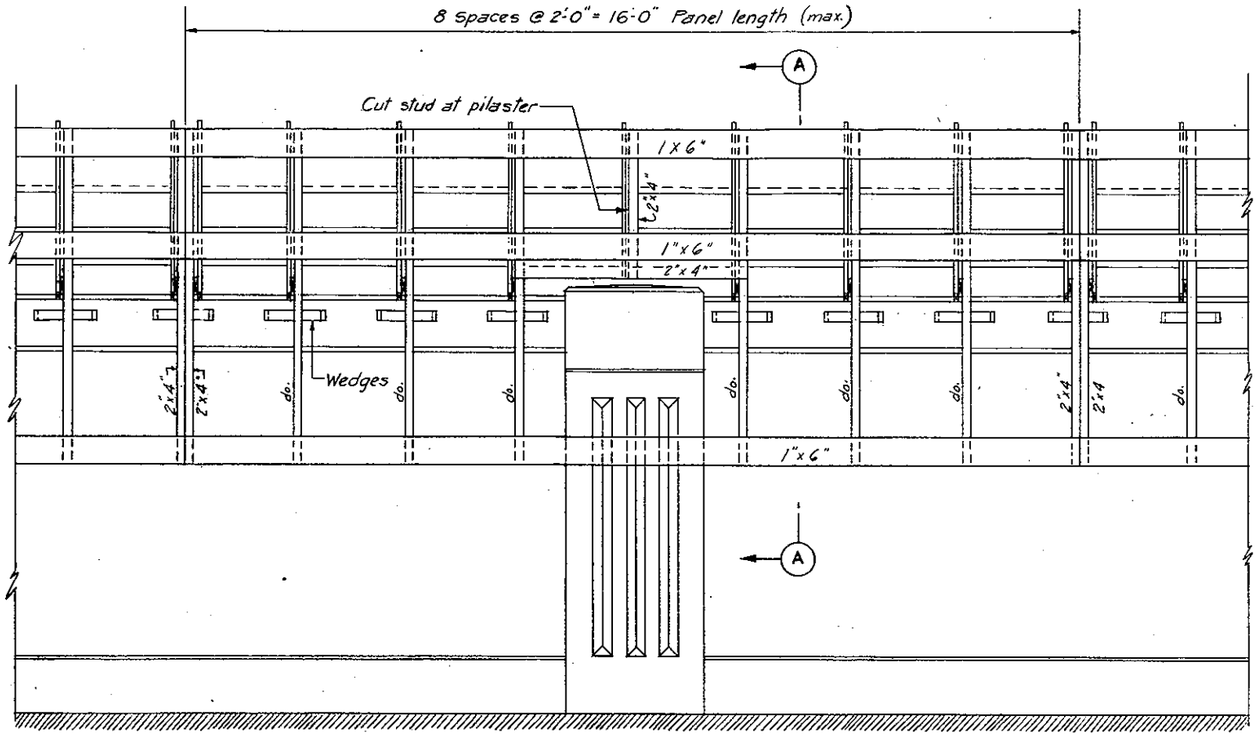


PLAN

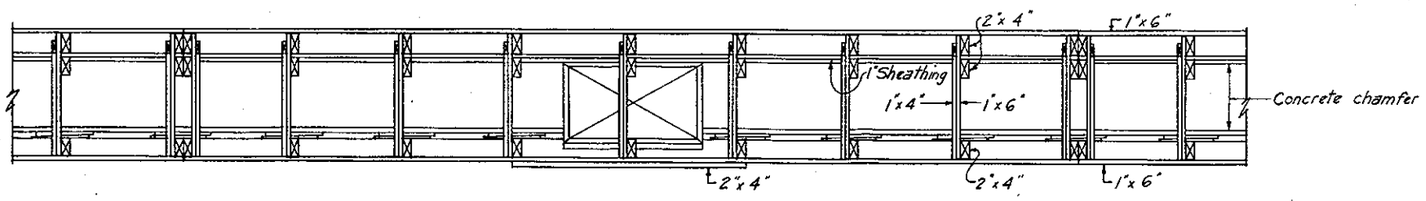
Socks should be laid shingle fashion and not mauled into place.

SACKING SLOUGHS
STANDARD HIGH WATER
MAINTENANCE INSTRUCTION

U.S. ENGINEER OFFICE, PROVIDENCE, R.I



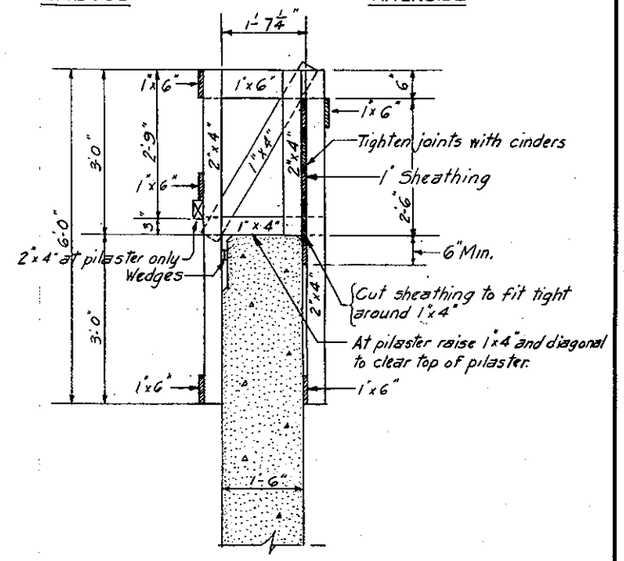
LANDSIDE ELEVATION



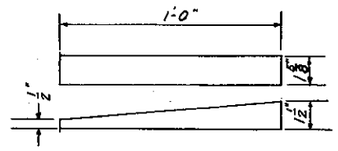
PLAN

BILL OF MATERIALS		
For one 8'-0" panel. Regular wall section.		
Uprights	10 pcs	2"x 4" x 6'-0"
Vert. brace	5 "	2"x4" x 3'-0"
Stringers	5 "	1"x 6"x 8'-0"
Upper ties	5 "	1"x 6" x 2'-3"
Lower ties	5 "	1" x 4" x 2'-3"
Diagonals	5"	1" x 4" x 3'-6"
Sheathing	6"	1" x 6" x 8'-0" or random widths to make up 36"
Wedges	8	(½" to 1½")x2"x1'-0" = 1-3"x2"x4'-0"
For one 8'-0" panel. Pilaster section Same as above list except:		
Substitute one upright 2"x4"x2'-9" for one 2"x4"x6'-0"		
Add one stringer piece 2"x4"x4'-2"		

LANDSIDE RIVERSIDE



SECTION A-A



WEDGE

KEY	DATE	REVISION (Indicated by △)	REV. BY	CK. BY	AP. BY

CONNECTICUT RIVER FLOOD CONTROL

EMERGENCY FLASH BOARDS FOR FLOOD WALLS

CONNECTICUT RIVER MASSACHUSETTS

IN 1 SHEETS SCALE: 3/4 IN. = 1 FT. SHEET NO. 1

U.S. ENGINEER OFFICE, PROVIDENCE, R.I., FEB. 1945

SUBMITTED: E. M. Viner, SENIOR ENGINEER

APPROVAL RECOMMENDED: S. Burns, CHIEF, ENGINEERING DIV.

APPROVED: W. J. Truss, COL., CORPS OF ENGINEERS, DISTRICT ENGINEER

PREPARED: C. J. Hugo, STRUCTURAL SECTION

DRAWN: E. J. H.

TRACED:

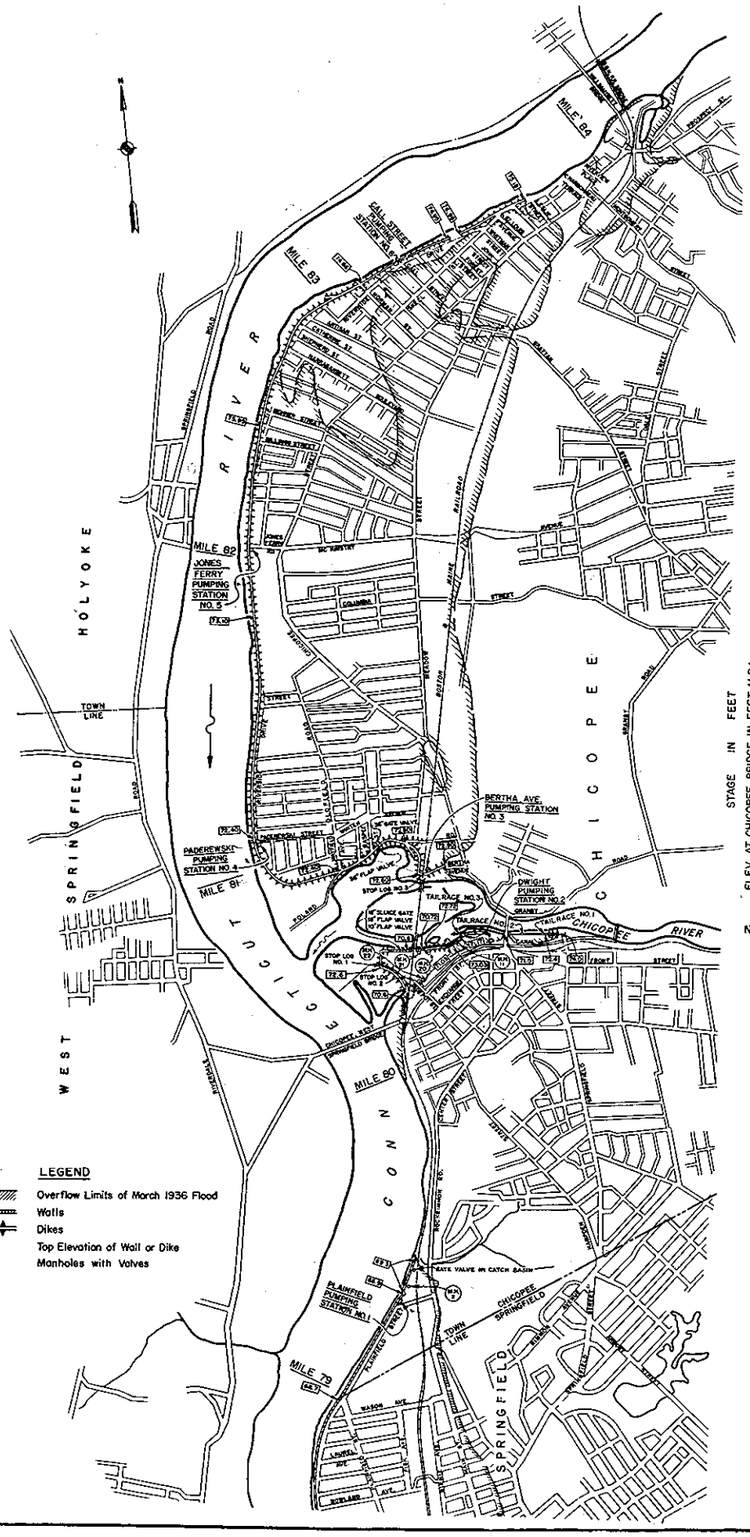
CHECKED:

FILE NO. CT-4-3408

PLATE V

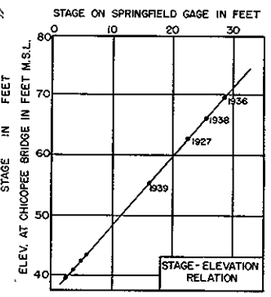
WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY



LEGEND

- Overflow Limits of March 1936 Flood
- Walls
- Dikes
- 71.03 — Top Elevation of Wall or Dike
- MH 20 — Manholes with Valves



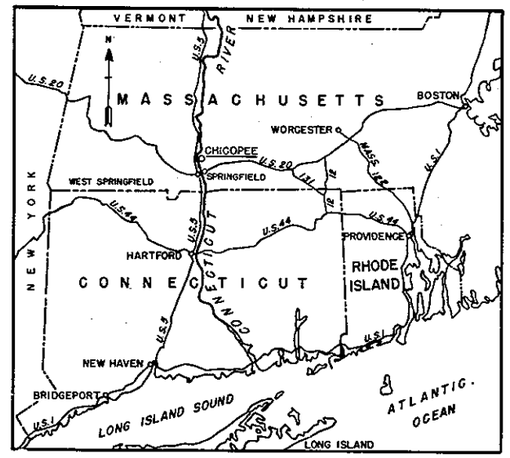
NOTE: SPRINGFIELD, MASS. CONNECTICUT RIVER GAGE IS A RECORDING GAGE LOCATED AT MEMORIAL BRIDGE. ZERO OF GAGE IS 37.3 MEAN SEA LEVEL.

CONNECTICUT RIVER GAGE

GAGE LOCATED AT EAST END OF CHICOPEE - WEST SPRINGFIELD BRIDGE. GAGE CALIBRATED IN FEET ABOVE MEAN SEA LEVEL.

SCHEDULE OF OPERATIONS

68.0	
67.0	
66.0	Close stop log structure No. 3. (Plate No. XVII)
65.0	Close gate valves in No. 2 manhole and in catch basin at Springfield Rendering Co. (Plate No. XXXVIII) Close stop log structure No. 2. (Plate No. XXIII)
64.0	Close stop log structure No. 1. (Plate No. XXIII)
63.0	
62.0	
61.0	Clear flap valve on 10" pipe outlet Moore Drop Forge Co. (Plate No. XXXV)
60.0	
59.0	
58.0	Start operation of Plainfield Pumping Station No. 1 (Plate No. XLII)
57.0	
56.0	Start operation of Dwight Pumping Station No. 2 (Plate No. XXXIII)
55.0	Close 18" sluice gate in manhole at Moore Drop Forge Co. (Plate No. XXXV)
54.0	Close 12" gate valve in manhole No. 22 (Plate No. XXVII) Close 8" gate valve in manhole No. 21 (Plate No. XXVI) Close 16" sluice gate in manhole No. 20 (Plate No. XXVI)
53.0	Clear flap valve on 18" pipe outlet Moore Drop Forge Co. (Plate No. XXXV) Close 30" sluice gate in manhole No. 11 (Plate No. XXV) Close tailrace gate No. 2 (Plate No. XXIII) Close tailrace gate No. 1 (Plate No. XXIII)
52.0	Close gate valve on 36" pipe intake at Gaspee St. (Plate No. XVII)
51.0	
50.0	
49.0	Clear flap valve on manhole No. 22 outlet (Plate No. XXVII) Clear flap valve on 36" pipe outlet at Gaspee St. (Plate No. XVII)
48.0	Start operation of Bertha Ave. Pumping Station No. 3 (Plate No. XLIV)
47.0	Clear flap valve on manhole No. 21 outlet (Plate No. XXVI)
46.0	Start operation of Coll Street Pumping Station No. 6 (Plate No. LIV) Start operation of Jones Ferry Pumping Station No. 5 (Plate No. LI)
45.0	Clear flap valve at Plainfield Pumping Station No. 1 outlet (Plate No. XLI)
44.0	
43.0	Start operation of Paderewski Pumping Station No. 4 (Plate No. XLVII)
42.0	Clear flap valve on manhole No. 20 outlet (Plate No. XXVI) Clear flap valve on manhole No. 11 outlet (Plate No. XXV) Clear flap valves at Bertha Ave. Pumping Station No. 3 outlet (Plate No. XLIII)



LOCATION MAP

SCALE OF MILES 0 10 20 30

NOTES

CLOSURE STRUCTURE

When the Connecticut River reaches elevation 62.0 on the gage located at the Chicopee - West Springfield Bridge, stop log timbers and other closure parts shall be delivered at the following locations and should be in position when the river reaches the elevations listed below :

64.9	Stop log No. 1
66.5	Stop log No. 2
67.5	Stop log No. 3

PARTIES TO BE NOTIFIED

When the Connecticut River reaches the elevations shown below on the gage, the parties listed opposite the elevations below shall be notified as indicated :

- *52.0 Notify A. G. Spalding Co. that gates on tailraces No. 1 and No. 2 are to be closed.*
- *56.5 Notify Turners Falls P. & E. Co. that gates on tailrace No. 3 are to be closed.*
- *63.5 Notify B. & M. R.R., Turners Falls P. & E. Co., and Moore Drop Forge Co. that stop log No. 1 is to be closed.*
- *65.0 Notify Industrial Building Corporation, Turners Falls P. & E. Co., and Moore Drop Forge Co. that stop log No. 2 is to be closed.*
- *66.0 Notify B. & M. R.R. Office at Greenfield, Mass. that stop log No. 3 is to be closed.*

CONNECTICUT RIVER FLOOD CONTROL

FLOOD PROTECTION SYSTEM

CHICOPEE, MASS.

OPERATIONS CHART

IN 1 SHEETS — SCALE: 1 IN. = 1000 FT. (0 1000' 2000') — SHEET NO. 1

U. S. ENGINEER OFFICE, PROVIDENCE, R. I., MAY, 1945

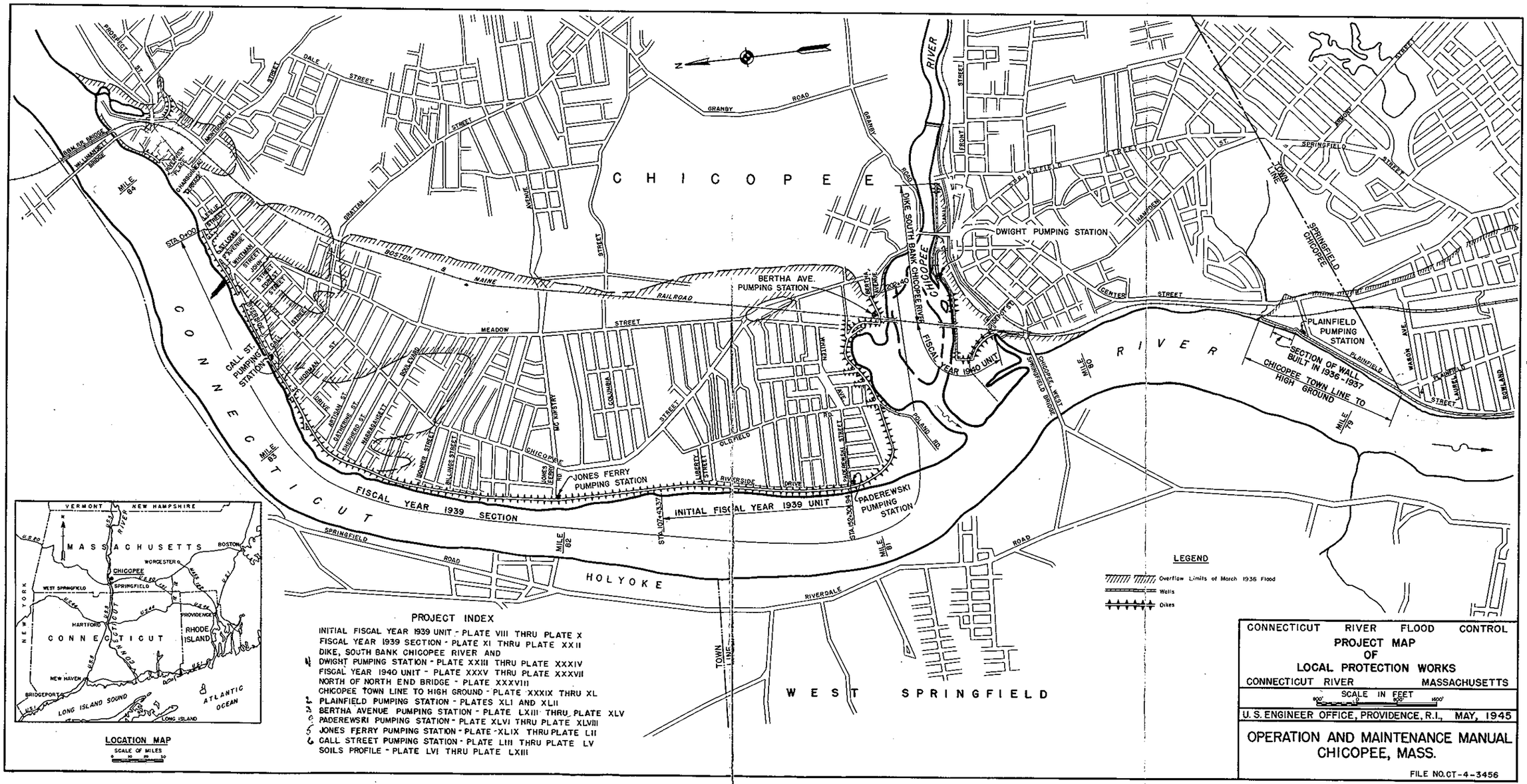
SUBMITTED:	APPROVAL RECOMMENDED:	APPROVED:
SENIOR ENGINEER OPERATIONS DIV.	SENIOR ENGINEER CHIEF, OPERATIONS DIVISION	COL., CORPS OF ENGINEERS DISTRICT ENGINEER

DRAWN: D.H.R., W.S.B.
TRACED: D.H.R.
CHECKED:

FILE NO. CT-4-3455

PLATE VI

Brightwood Intercepter



LOCATION MAP
SCALE OF MILES

PROJECT INDEX

INITIAL FISCAL YEAR 1939 UNIT - PLATE VIII THRU PLATE X
FISCAL YEAR 1939 SECTION - PLATE XI THRU PLATE XXII
DIKE, SOUTH BANK CHICOPEE RIVER AND
4 DWIGHT PUMPING STATION - PLATE XXIII THRU PLATE XXXIV
FISCAL YEAR 1940 UNIT - PLATE XXXV THRU PLATE XXXVII
NORTH OF NORTH END BRIDGE - PLATE XXXVIII
CHICOPEE TOWN LINE TO HIGH GROUND - PLATE XXXIX THRU XL
2 PLAINFIELD PUMPING STATION - PLATES XLI AND XLII
3 BERTHA AVENUE PUMPING STATION - PLATE LXIII THRU PLATE XLV
6 PADEREWSKI PUMPING STATION - PLATE XLVI THRU PLATE XLVIII
5 JONES FERRY PUMPING STATION - PLATE XLIX THRU PLATE LII
1 CALL STREET PUMPING STATION - PLATE LIII THRU PLATE LV
SOILS PROFILE - PLATE LVI THRU PLATE LXIII

CONNECTICUT RIVER FLOOD CONTROL
PROJECT MAP
OF
LOCAL PROTECTION WORKS
CONNECTICUT RIVER MASSACHUSETTS
SCALE IN FEET
U. S. ENGINEER OFFICE, PROVIDENCE, R.I., MAY, 1945

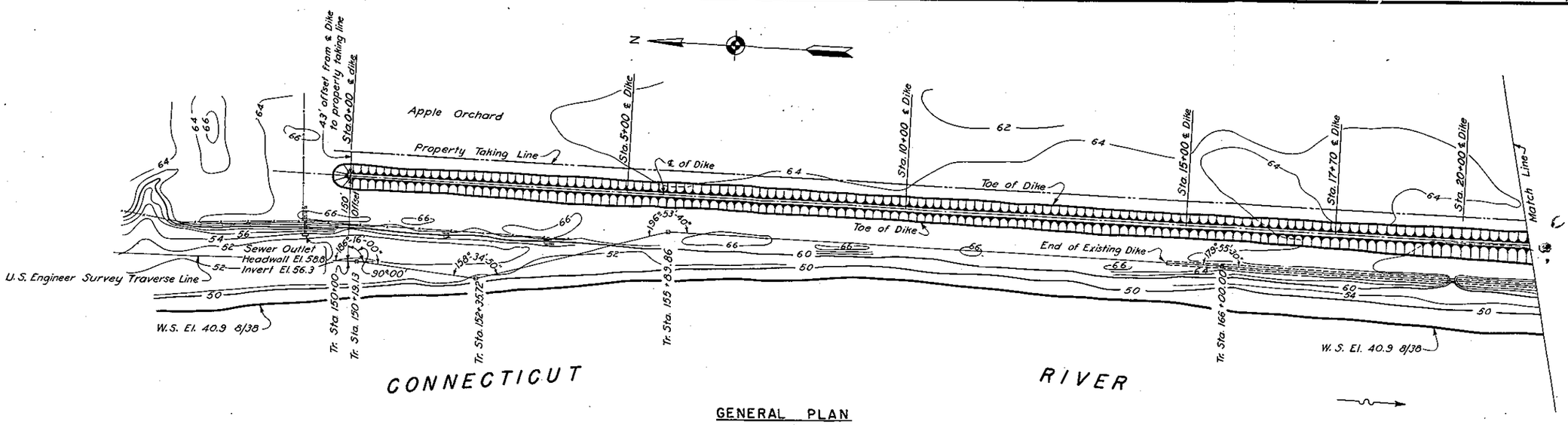
OPERATION AND MAINTENANCE MANUAL
CHICOPEE, MASS.

FILE NO. CT-4-3456

PLATE VII

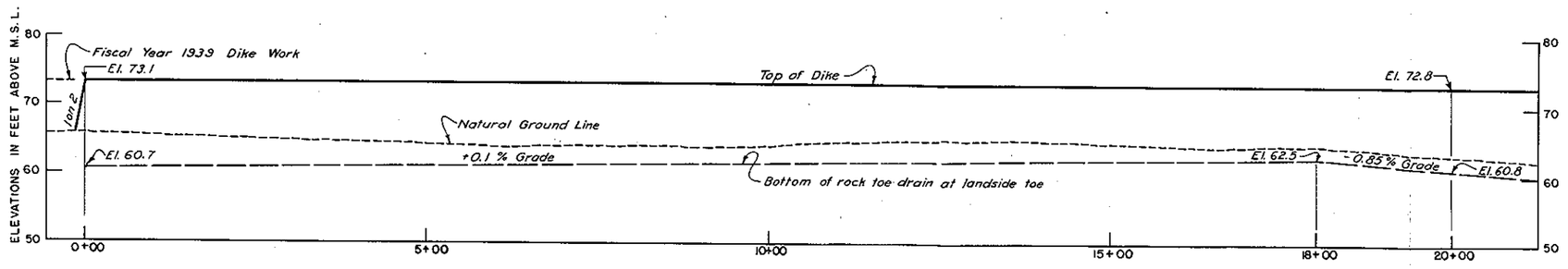
WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY



GENERAL PLAN

SCALE 1" = 100'



PROFILE ALONG ℄ DIKE

HORIZONTAL SCALE 1"= 100'

VERTICAL SCALE 1"= 10'

NOTES

For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

CHICOPEE DIKE

INITIAL FISCAL YEAR 1939 UNIT

GENERAL PLAN

STATION 0+00 TO 21+20

CONNECTICUT RIVER, MASSACHUSETTS

SCALE 1 IN = 100FT

100' 0 100' 200'

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,

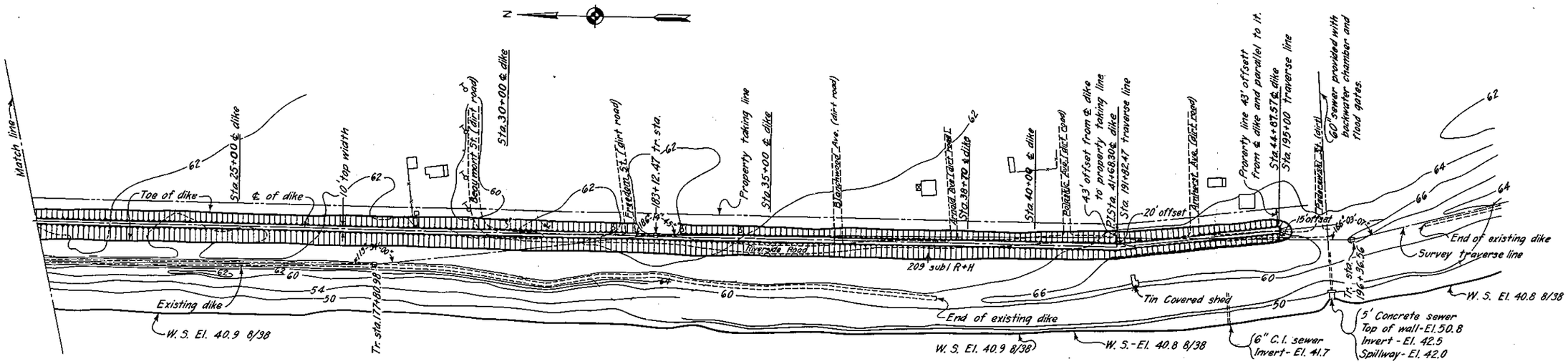
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE VIII

WAR DEPARTMENT

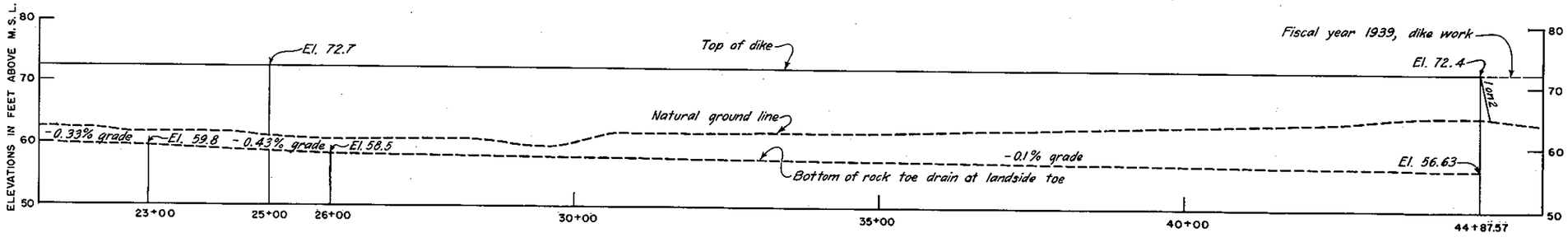
CORPS OF ENGINEERS, U. S. ARMY



CURVE DATA
I = 6°47'40"
D = 6°48'-32"
R = 841.75'
T = 50.00'
Arc. = 99.82'
P.C. = Sta. 41+18.30
P.T. = Sta. 42+18.12

GENERAL PLAN

SCALE: 1" = 100'



PROFILE ALONG ℄ DIKE

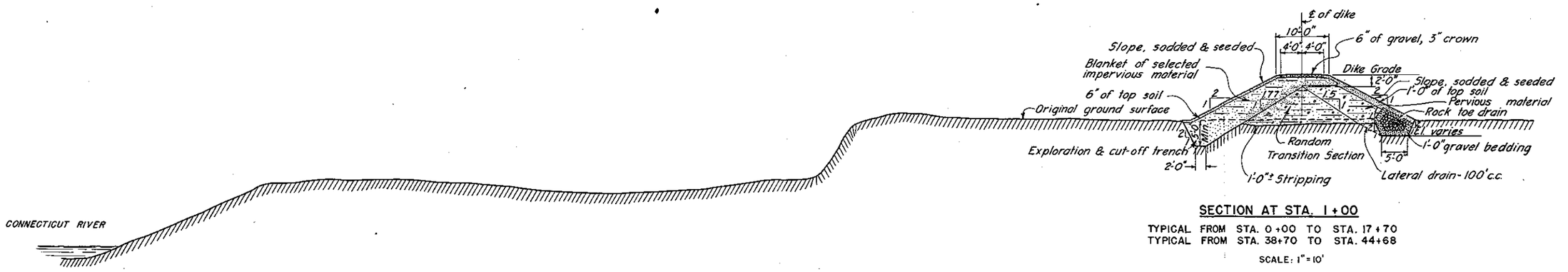
HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 10'

NOTE

For further details see contract drawings furnished City.

CONNECTICUT RIVER FLOOD CONTROL
CHICOPEE DIKE
INITIAL FISCAL YEAR 1939 UNIT
GENERAL PLAN
STATION 21+20 TO 44+87.57
CONNECTICUT RIVER MASSACHUSETTS
SCALE 1 IN. = 100 FT.
U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,
OPERATION AND MAINTENANCE MANUAL
CHICOPEE, MASS

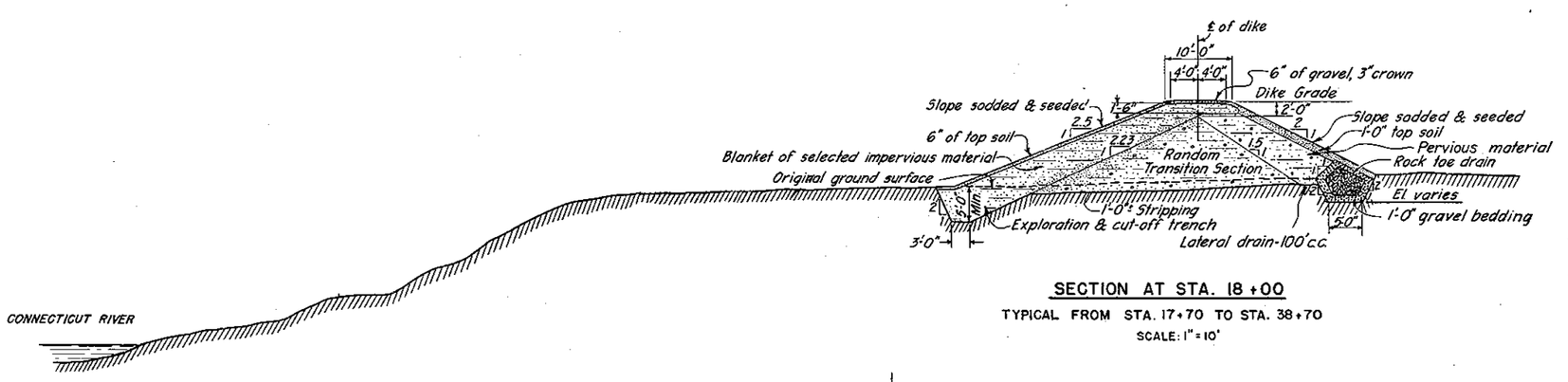
PLATE IX



SECTION AT STA. 1+00

TYPICAL FROM STA. 0+00 TO STA. 17+70
TYPICAL FROM STA. 38+70 TO STA. 44+68

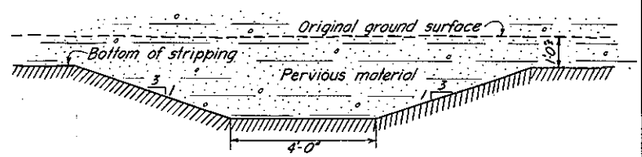
SCALE: 1"=10'



SECTION AT STA. 18+00

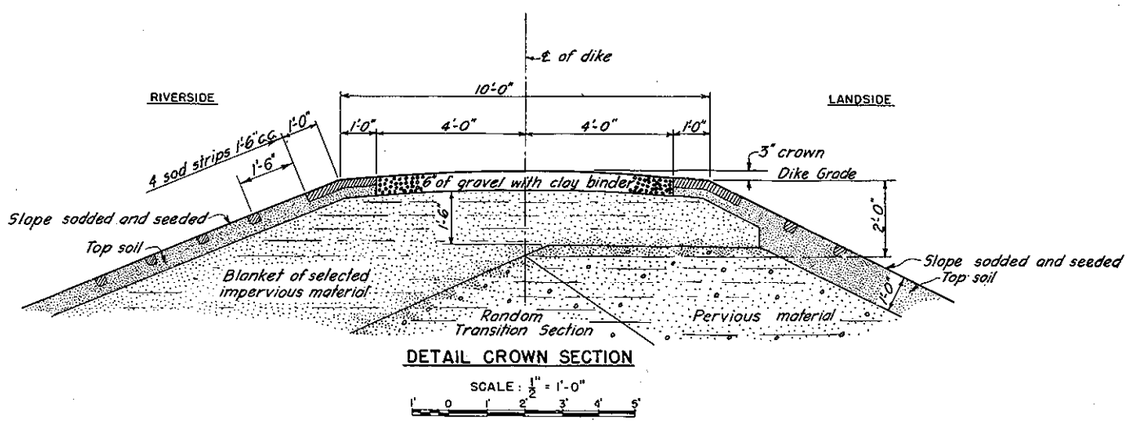
TYPICAL FROM STA. 17+70 TO STA. 38+70

SCALE: 1"=10'



TYPICAL CROSS SECTION OF LATERAL DRAIN

SCALE: 1/2"=1'-0"



DETAIL CROWN SECTION

SCALE: 1/2" = 1'-0"

1' 0 1' 2' 3' 4' 5'

NOTE

All stations are along ℄ of dike.

CONNECTICUT RIVER FLOOD CONTROL

CHICOPEE DIKE

INITIAL FISCAL YEAR 1939 UNIT

EMBANKMENT DETAILS

CHICOPEE, MASS.

CONNECTICUT RIVER — MASSACHUSETTS

SCALE: 1IN.= 10 FT.

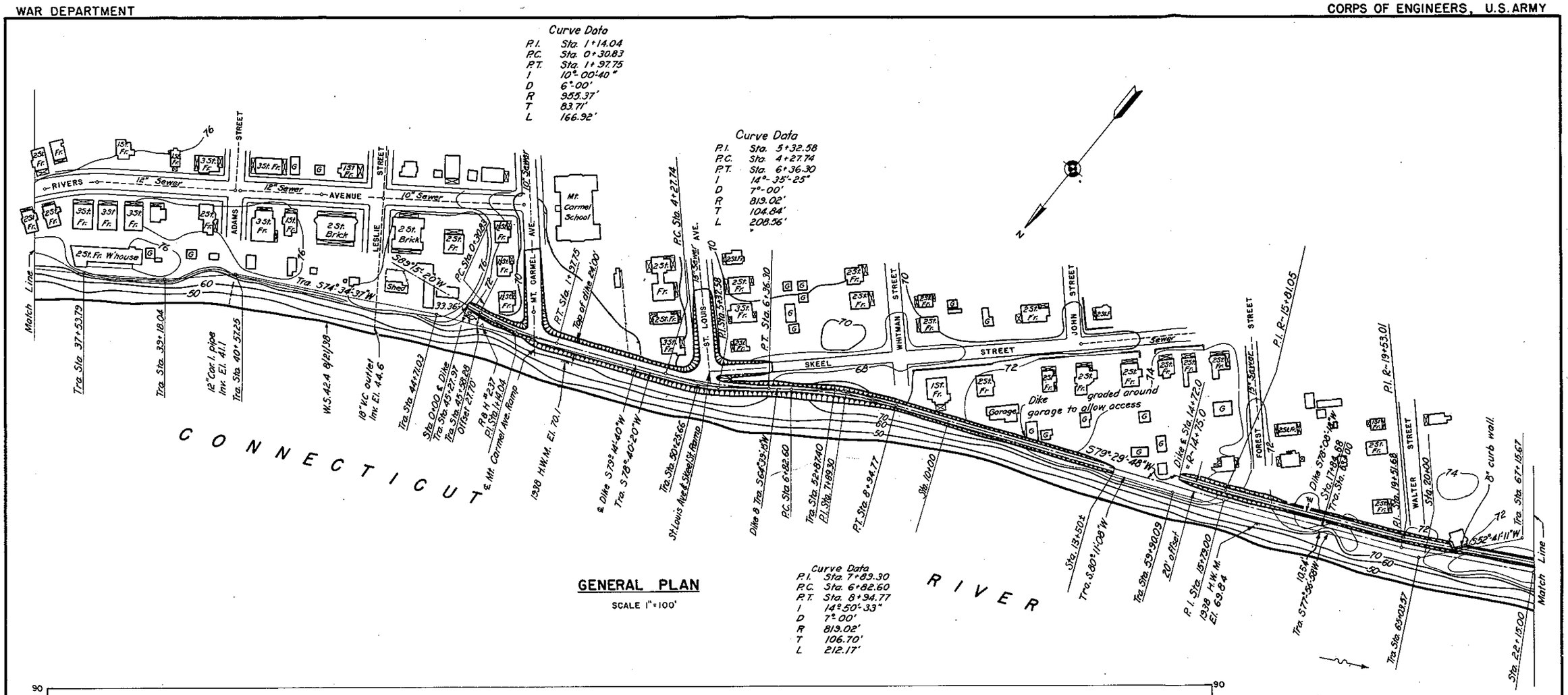
10' 0 10' 20'

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE X



NOTE

For further details see contract drawings furnished City.

CONNECTICUT RIVER FLOOD CONTROL

CHICOPEE DIKE

FISCAL YEAR 1939 SECTION

GENERAL PLAN-STA.0+00 TO STA.22+15

CHICOPEE, MASS.

CONNECTICUT & CHICOPEE RIVERS, MASSACHUSETTS

SCALE 1 IN. = 100 FT.

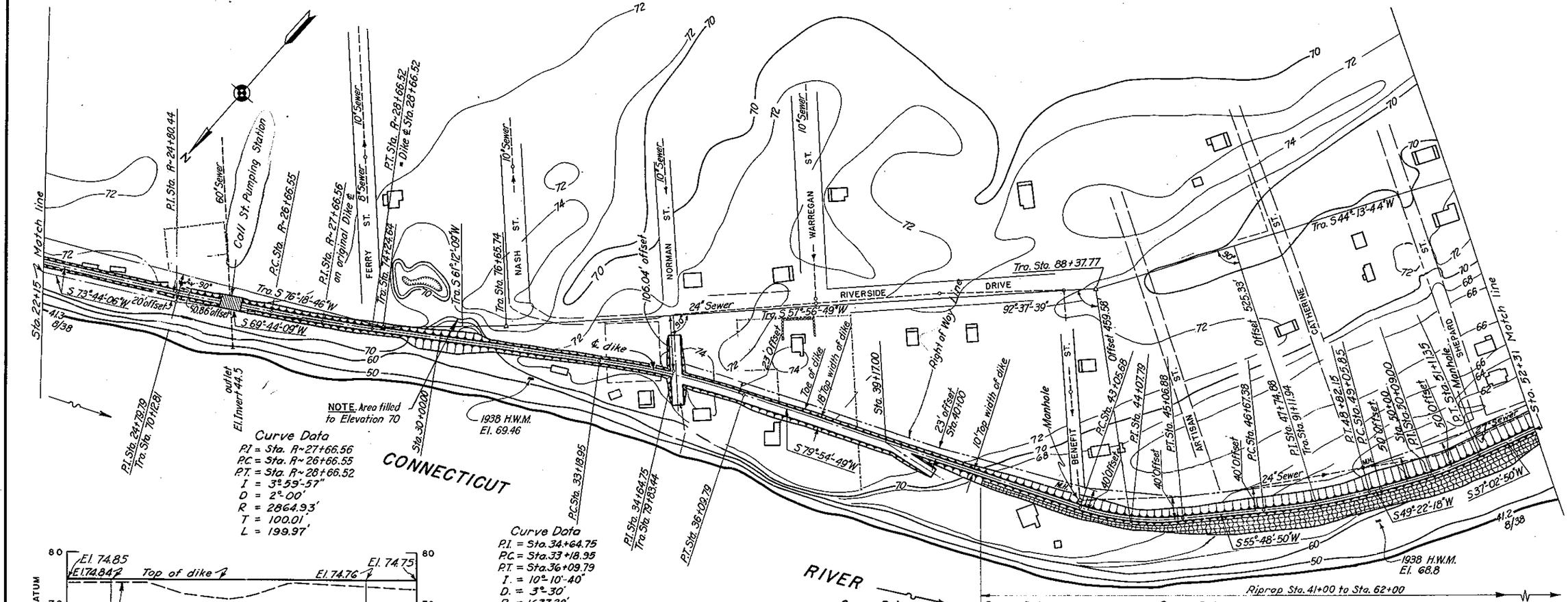
100' 0 100' 200'

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE XI



Curve Data
P.I. = Sta. R-27+66.56
P.C. = Sta. R-26+66.55
P.T. = Sta. R-28+66.52
I = 3°-59'-57"
D = 2°-00'
R = 2864.93'
T = 100.01'
L = 199.97'

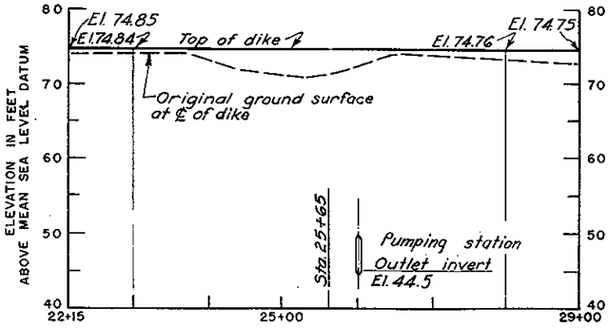
Curve Data
P.I. = Sta. 34+64.75
P.C. = Sta. 33+18.95
P.T. = Sta. 36+09.79
I. = 10°-10'-40"
D. = 3°-30'
R. = 1637.28'
T. = 145.80'
L. = 290.84'

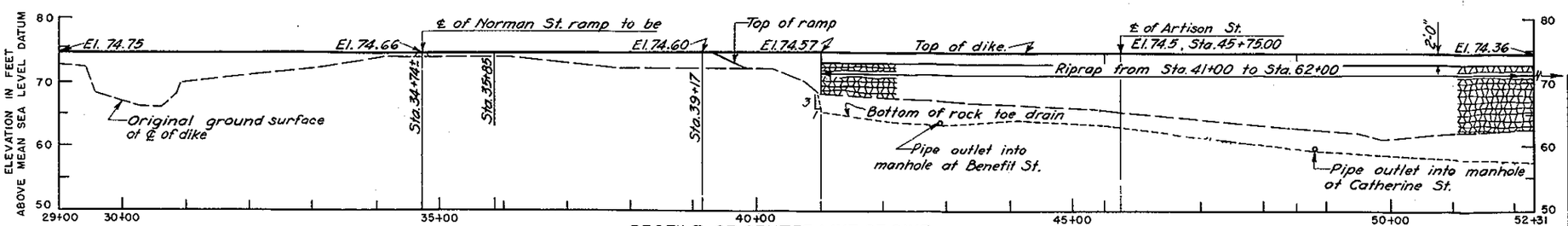
Curve Data
P.I. = Sta. 44+07.79
P.C. = Sta. 43+05.68
P.T. = Sta. 45+06.88
I. = 24°-05'-59"
D. = 12°-00'
R. = 478.34'
T. = 102.11'
L. = 201.20'

Curve Data
P.I. = Sta. 47+74.88
P.C. = Sta. 46+67.38
P.T. = Sta. 48+82.15
I. = 6°-26'-32"
D. = 3°-00'
R. = 1910.08'
T. = 107.50'
L. = 214.77'

Curve Data
P.I. = Sta. 50+09.00
P.C. = Sta. 49+05.85
P.T. = Sta. 51+11.35
I. = 12°-19'-28"
D = 6°-00'
R = 955.37'
T = 103.15'
L = 205.50'

GENERAL PLAN
SCALE: 1" = 100'





PROFILE OF CENTER LINE OF DIKE
SCALE: HOR. 1" = 10'
VERT. 1" = 100

NOTES:
Elevations refer to Mean Sea Level datum
For further details see contract drawings furnished city.

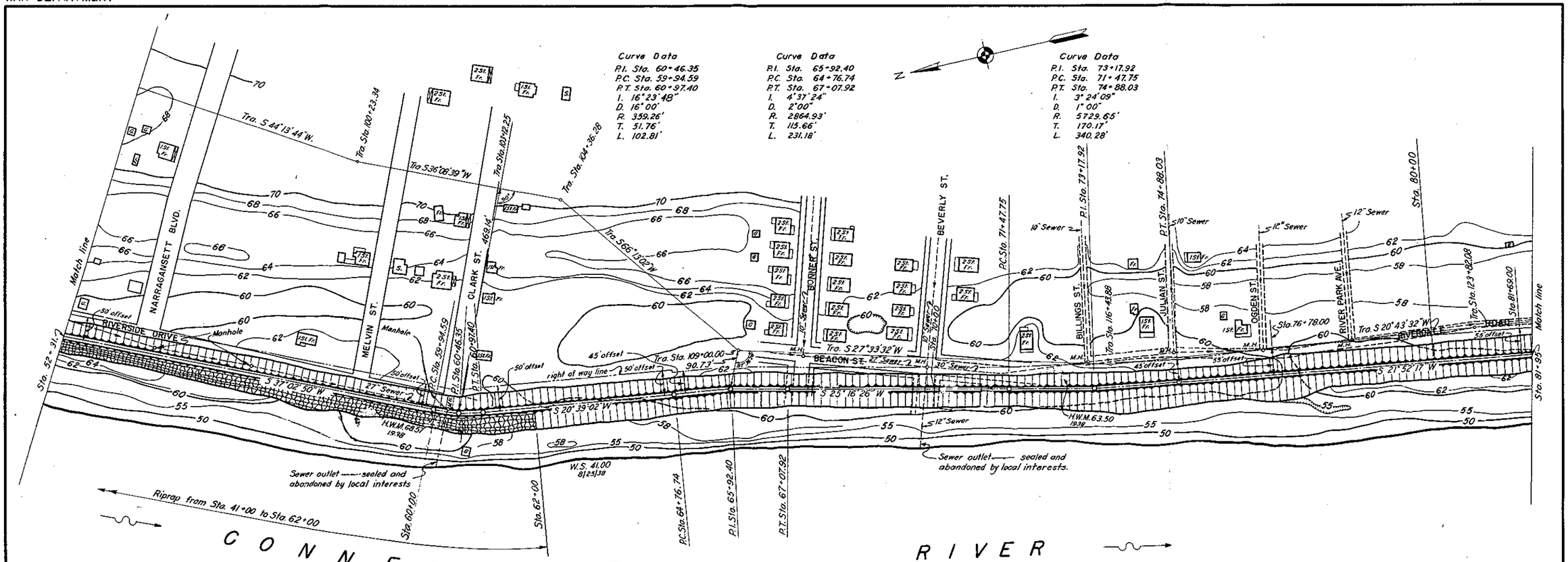
CONNECTICUT RIVER FLOOD CONTROL
CHICOPEE DIKE
FISCAL YEAR 1939 SECTION
GENERAL PLAN - STA. 22+15 TO STA. 52+31
CHICOPEE, MASS.
CONNECTICUT & CHICOPEE RIVERS, MASSACHUSETTS
SCALE 1 IN. = 100 FT.
U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,

OPERATION AND MAINTENANCE MANUAL
CHICOPEE. MASS

PLATE XII

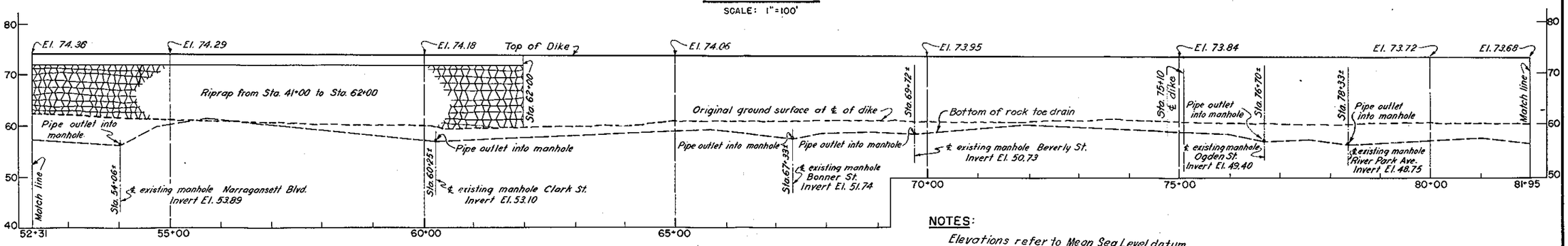
WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY



GENERAL PLAN

SCALE: 1"=100'



PROFILE OF CENTER LINE OF DIKE

SCALE: HOR. 1"= 100'
VERT. 1"= 10'

NOTES:

Elevations refer to Mean Sea Level datum.
For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

CHICOPEE DIKE

FISCAL YEAR 1939 SECTION

GENERAL PLAN- STA. 52+31 TO STA. 81+95

CHICOPEE, MASS.

CONNECTICUT & CHICOPEE RIVERS MASSACHUSETTS

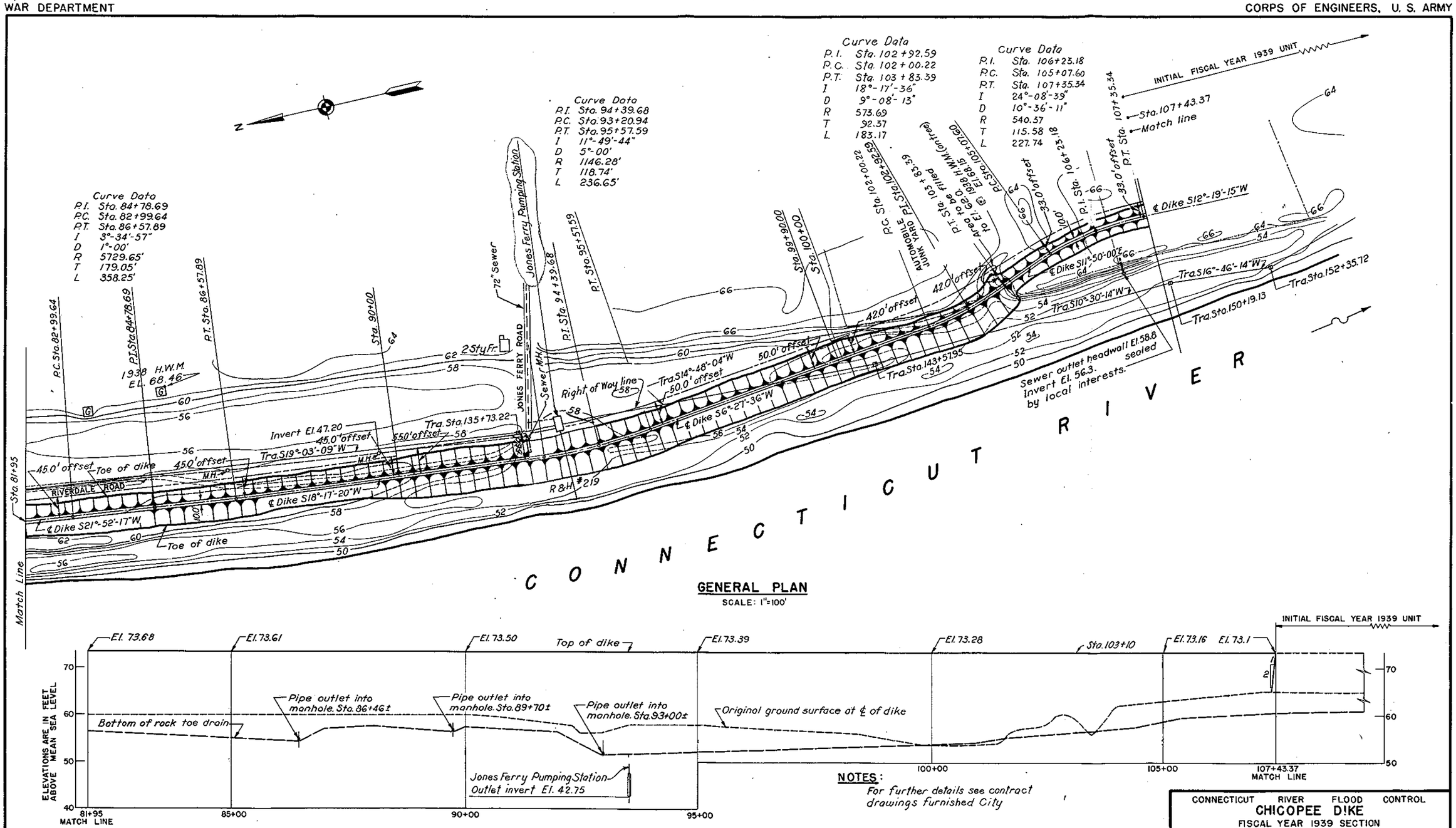
SCALE 1IN=100 FT.

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE XIII



GENERAL PLAN

SCALE: 1"=100'

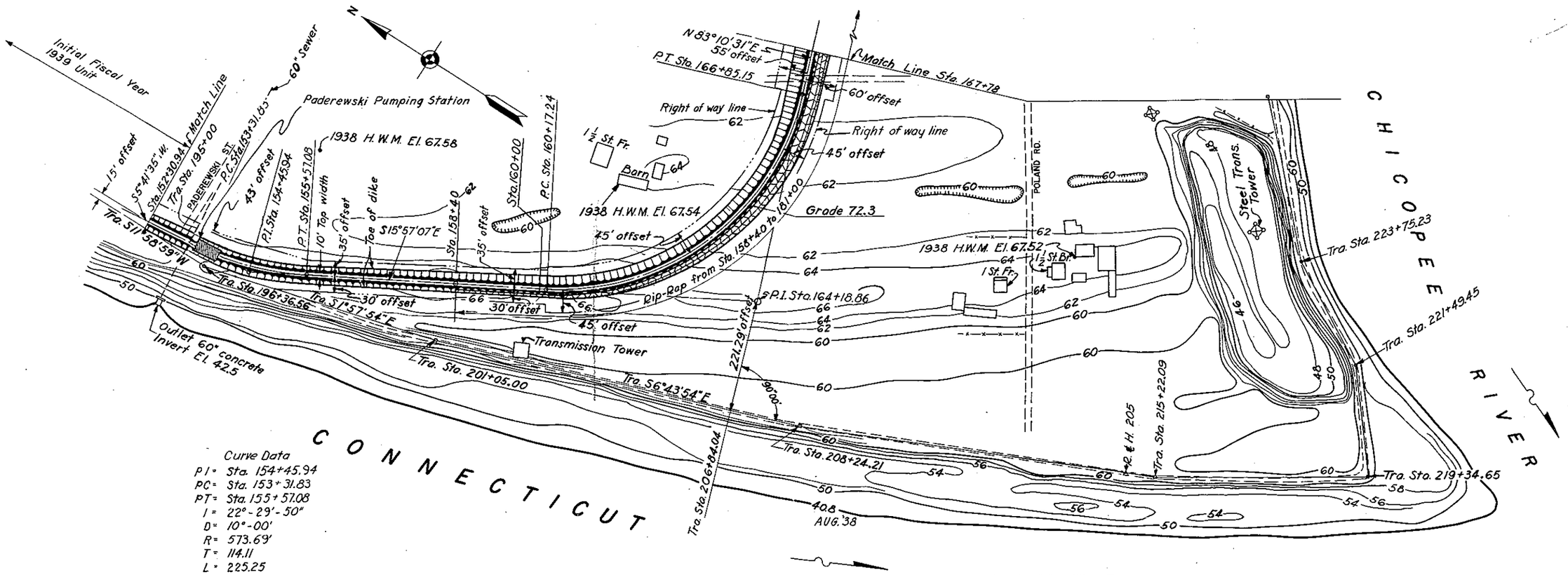
PROFILE OF CENTER LINE OF DIKE

SCALE: HORIZONTAL 1"=100'
VERTICAL 1"=10'

NOTES:
For further details see contract drawings furnished City

CONNECTICUT RIVER FLOOD CONTROL
CHICOPEE DIKE
FISCAL YEAR 1939 SECTION
GENERAL PLAN-STA.81+95 TO STA.107+43.37
CHICOPEE, MASS.
CONNECTICUT & CHICOPEE RIVERS, MASSACHUSETTS
SCALE 1 IN = 100 FT.
U.S. ENGINEER OFFICE, PROVIDENCE, R.I.
OPERATION AND MAINTENANCE MANUAL
CHICOPEE, MASS

PLATE XIV

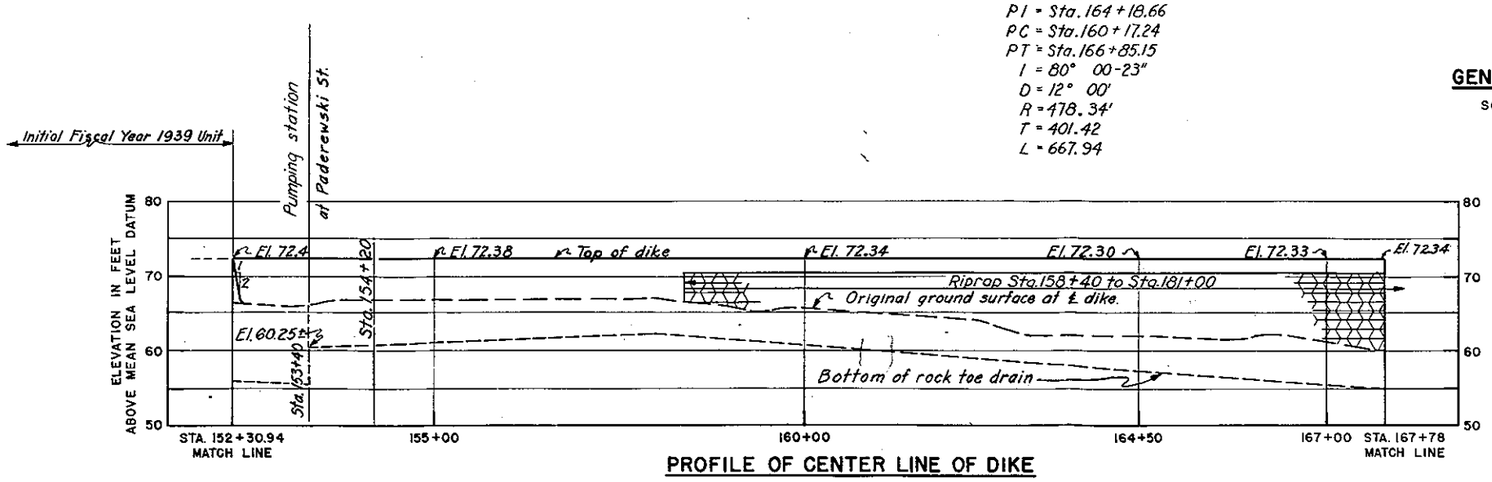


Curve Data
PI = Sta. 154+45.94
PC = Sta. 153+31.83
PT = Sta. 155+57.08
I = 22°-29'-50"
D = 10°-00'
R = 573.69'
T = 114.11
L = 225.25

Curve Data
PI = Sta. 164+18.66
PC = Sta. 160+17.24
PT = Sta. 166+85.15
I = 80° 00-23"
D = 12° 00'
R = 478.34'
T = 401.42
L = 667.94

GENERAL PLAN

SCALE 1" = 100'



PROFILE OF CENTER LINE OF DIKE

SCALE: HOR. 1" = 100'
VERT. 1" = 10'

NOTES:

For further details see contract drawings furnished city.

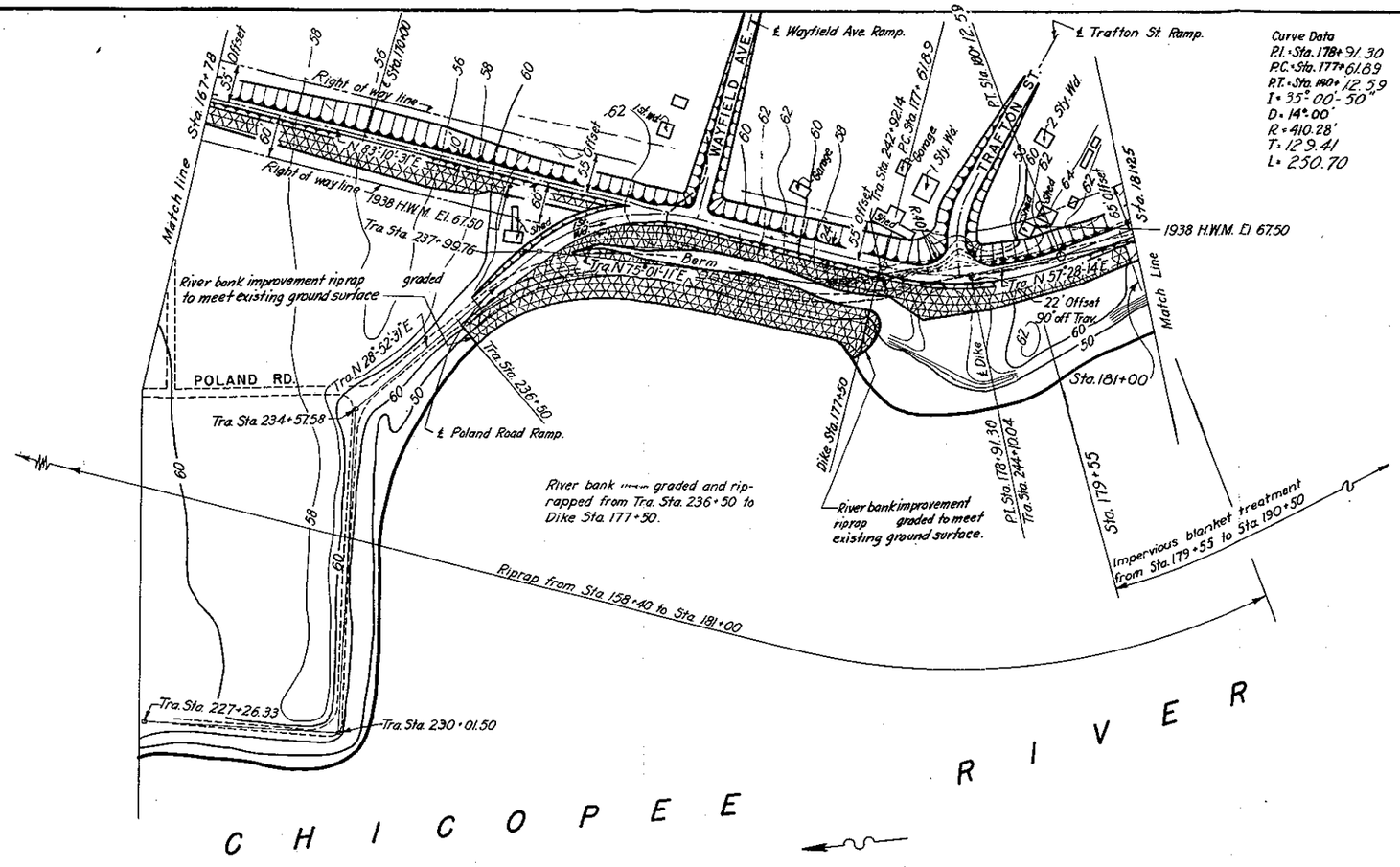
CONNECTICUT RIVER FLOOD CONTROL
CHICOPEE DIKE
FISCAL YEAR 1939 SECTION
GENERAL PLAN - STA. 152+30.94 TO 167+78
CHICOPEE, MASS.
CONNECTICUT & CHICOPEE RIVERS, MASSACHUSETTS
SCALE 1 IN. = 100 FT.
100' 0 100' 200'
U. S. ENGINEER OFFICE, PROVIDENCE, R. I.

OPERATION AND MAINTENANCE MANUAL
CHICOPEE, MASS

PLATE XV

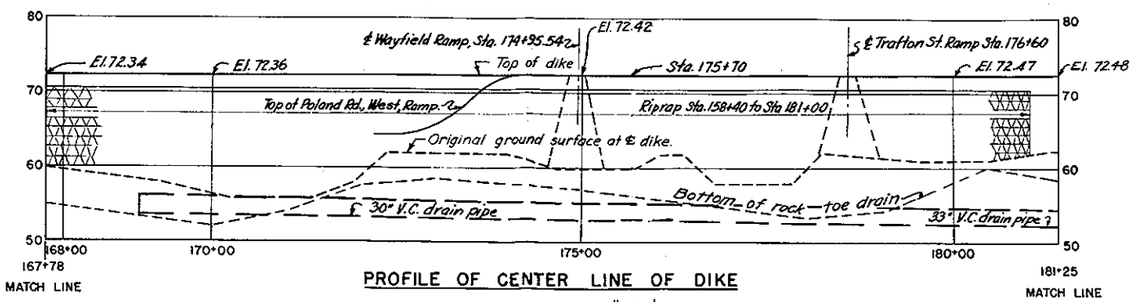
WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY



GENERAL PLAN

SCALE 1"= 100'



PROFILE OF CENTER LINE OF DIKE

SCALE: HORIZONTAL 1"= 100'
VERTICAL 1"= 10'

NOTES:

Elevations refer to Mean Sea Level datum. For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

CHICOPEE DIKE

FISCAL YEAR 1939 SECTION

GENERAL PLAN - STA. 167+78 TO STA. 181+25

CHICOPEE, MASS.

CONNECTICUT & CHICOPEE RIVERS MASSACHUSETTS

SCALE 1 IN.= 100 FT.

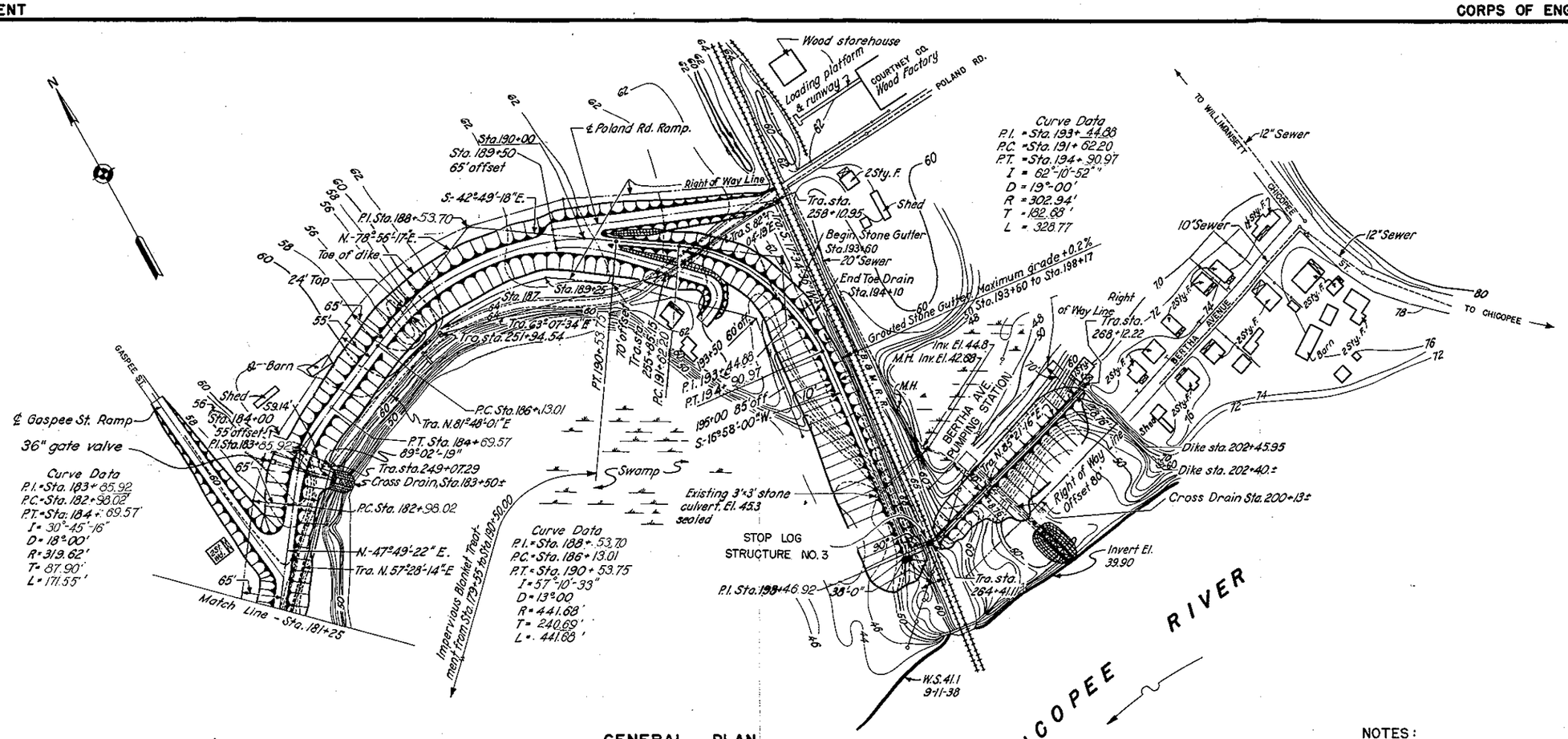
100' 0 100' 200'

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,

OPERATION AND MAINTENANCE MANUAL

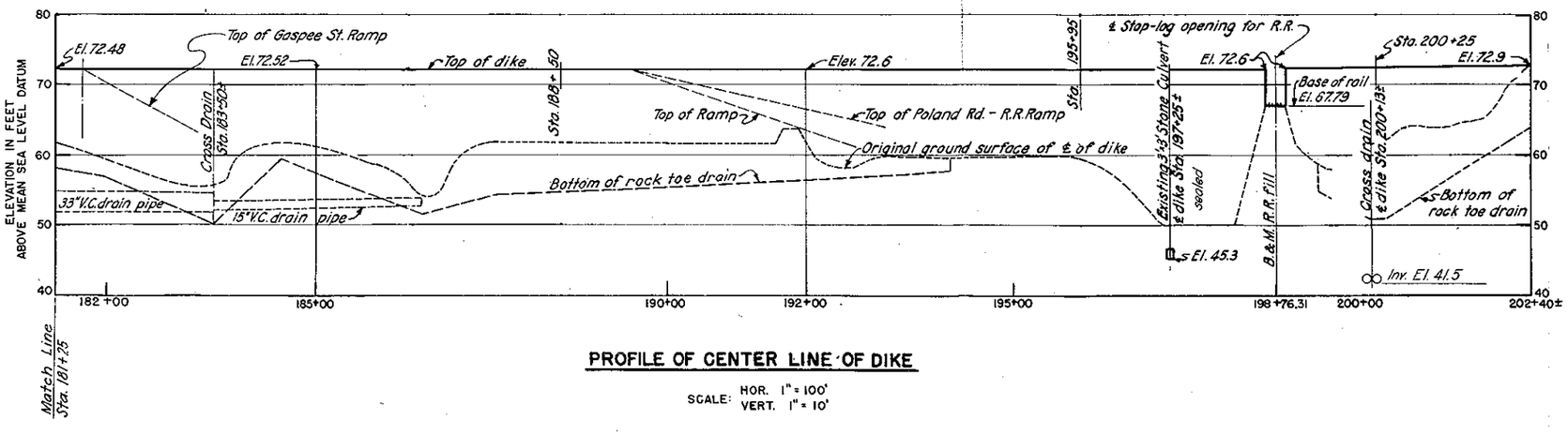
CHICOPEE, MASS

PLATE XVI



GENERAL PLAN

SCALE 1" = 100'



PROFILE OF CENTER LINE OF DIKE

SCALE: HOR. 1" = 100'
VERT. 1" = 10'

NOTES:

For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

CHICOPEE DIKE

FISCAL YEAR 1939 SECTION

GENERAL PLAN-STA. 181+25 TO 202+40±

CHICOPEE, MASS.

CONNECTICUT & CHICOPEE RIVERS MASSACHUSETTS

SCALE: 1 IN. = 100 FT.

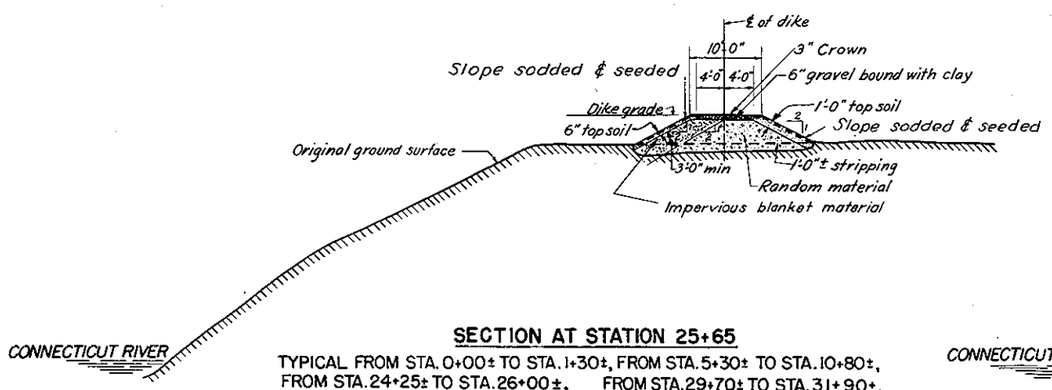
100' 0 100' 200'

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

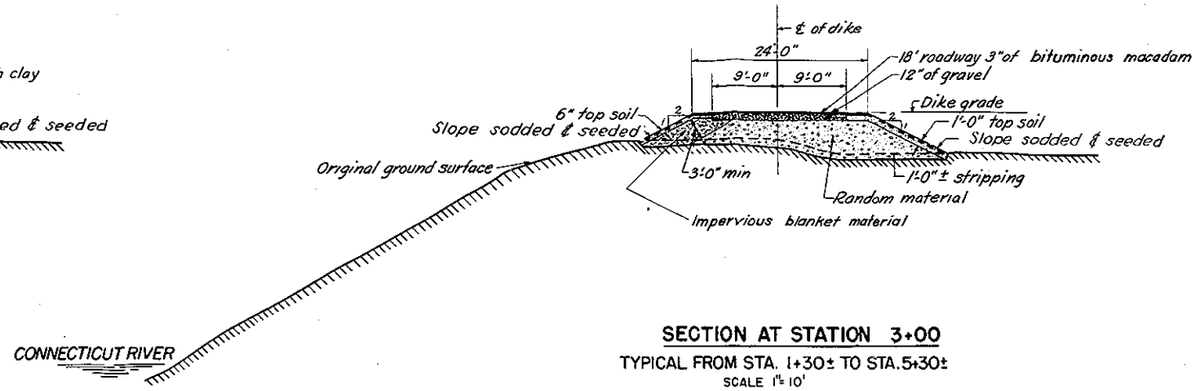
PLATE XVII



SECTION AT STATION 25+65

TYPICAL FROM STA. 0+00± TO STA. 1+30±, FROM STA. 5+30± TO STA. 10+80±, FROM STA. 24+25± TO STA. 26+00±, FROM STA. 29+70± TO STA. 31+90±, AND FROM STA. 39+80± TO STA. 41+0±.

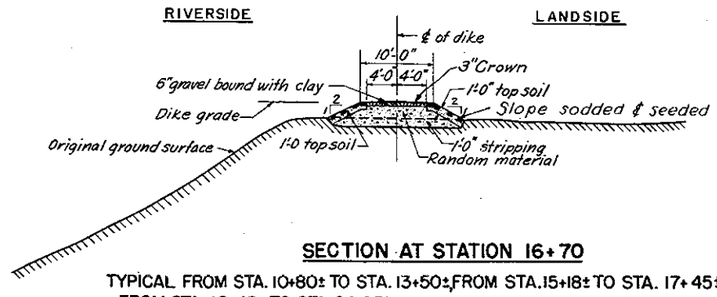
SCALE 1"=10'



SECTION AT STATION 3+00

TYPICAL FROM STA. 1+30± TO STA. 5+30±

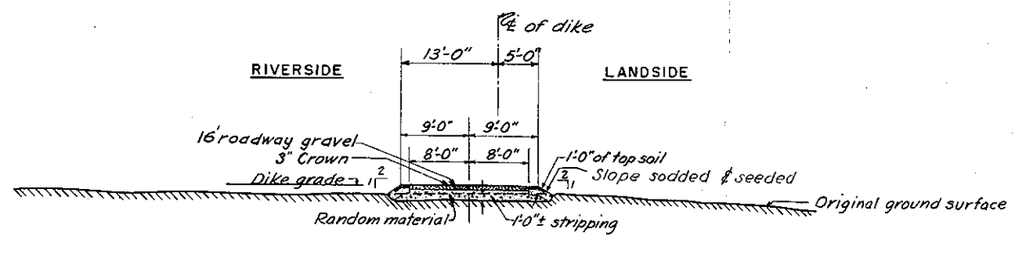
SCALE 1"= 10'



SECTION AT STATION 16+70

TYPICAL FROM STA. 10+80± TO STA. 13+50±, FROM STA. 15+18± TO STA. 17+45±, FROM STA. 18+45± TO STA. 24+25±, FROM STA. 26+00± TO STA. 29+70±, AND FROM STA. 31+90± TO STA. 34+70±.

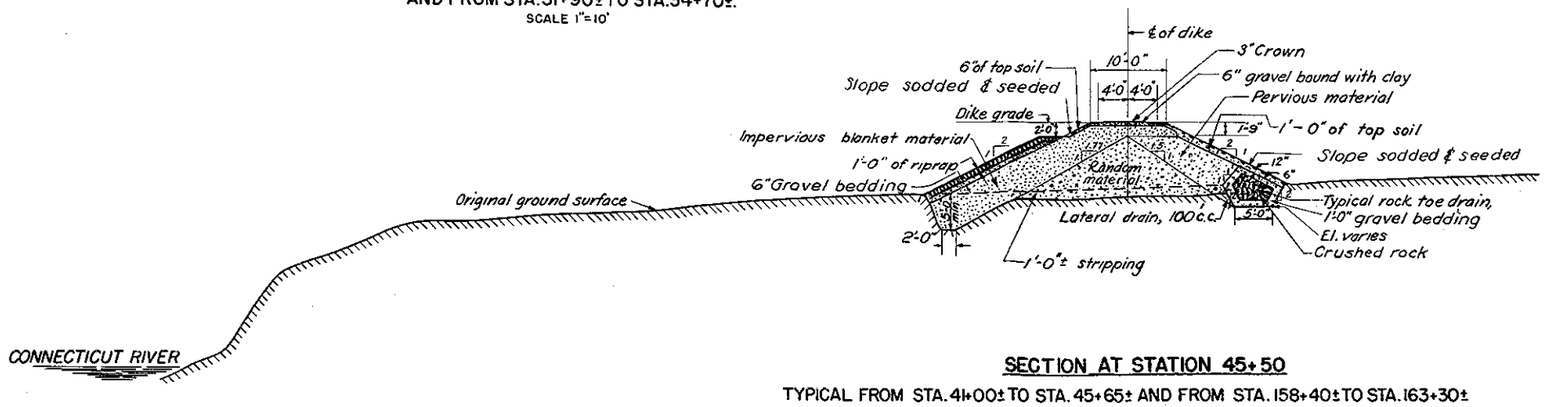
SCALE 1"=10'



SECTION AT STATION 35+85

TYPICAL FROM STA. 34+70± TO STA. 39+80±

SCALE 1"= 10'



SECTION AT STATION 45+50

TYPICAL FROM STA. 41+00± TO STA. 45+65± AND FROM STA. 158+40± TO STA. 163+30±

SCALE 1"= 10'

NOTES:

Elevations refer to mean sea level datum.

Dike grade at shoulders of dike crown, bituminous macadam roadway has 3" crown above dike grade.

For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

CHICOPEE DIKE

FISCAL YEAR 1939 SECTION

EMBANKMENT DETAILS - NO. 1

CHICOPEE, MASS.

CONNECTICUT & CHICOPEE RIVERS, MASSACHUSETTS

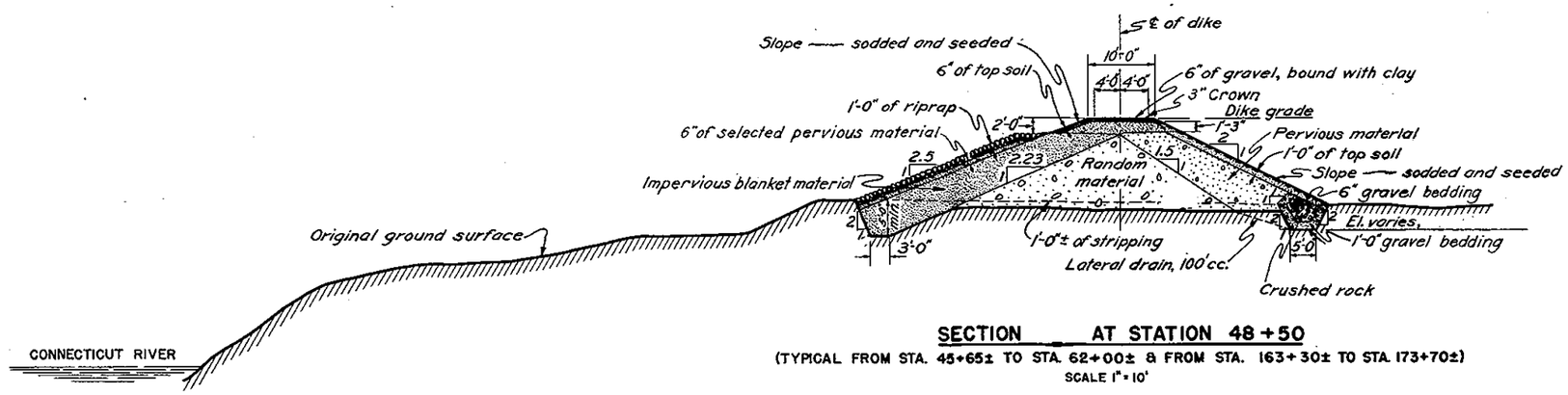
SCALE 1 IN. = 10'

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

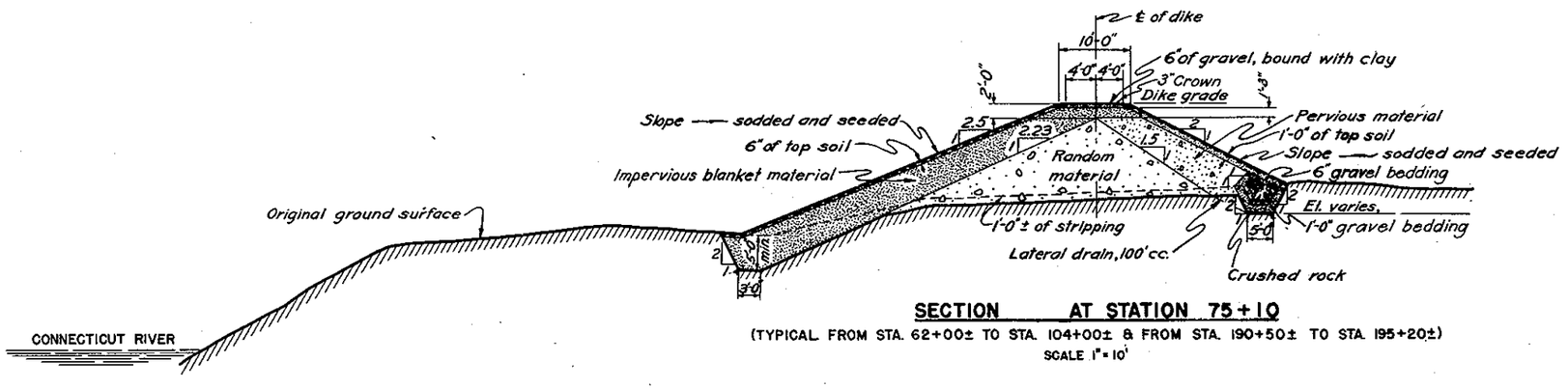
PLATE XVIII



SECTION AT STATION 48+50

(TYPICAL FROM STA. 45+65± TO STA. 62+00± & FROM STA. 163+30± TO STA. 173+70±)

SCALE 1" = 10'



SECTION AT STATION 75+10

(TYPICAL FROM STA. 62+00± TO STA. 104+00± & FROM STA. 190+50± TO STA. 195+20±)

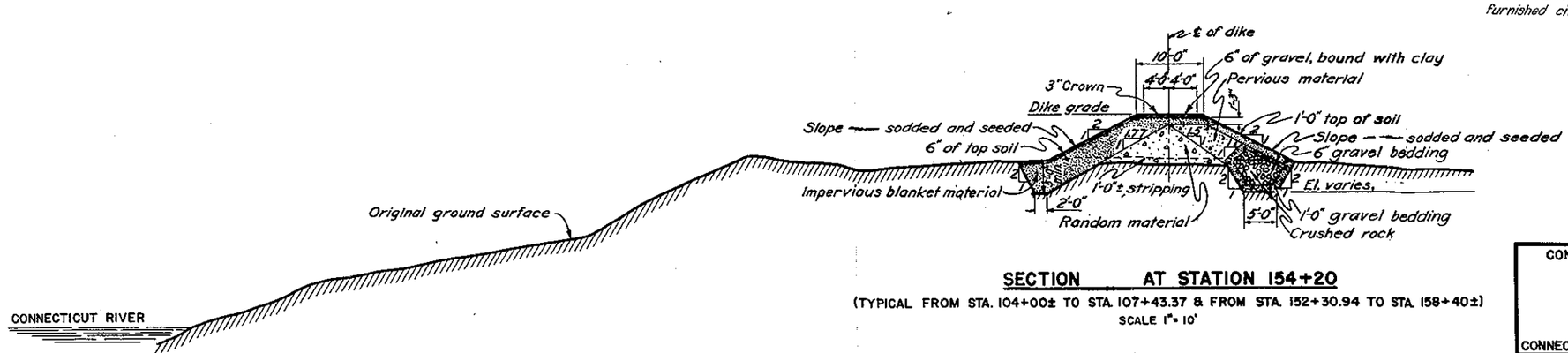
SCALE 1" = 10'

NOTES:

Elevations refer to mean sea level datum.

Dike grade is at shoulders of dike crown, gravel roadway has 3" crown above dike grade.

For further details see contract drawings furnished city.



SECTION AT STATION 154+20

(TYPICAL FROM STA. 104+00± TO STA. 107+43.37 & FROM STA. 152+30.94 TO STA. 158+40±)

SCALE 1" = 10'

CONNECTICUT RIVER FLOOD CONTROL

CHICOPEE DIKE

FISCAL YEAR 1939 SECTION

EMBANKMENT DETAILS – NO. 2

CHICOPEE, MASS.

CONNECTICUT & CHICOPEE RIVERS, MASSACHUSETTS

SCALE 1 IN. = 10 FT.

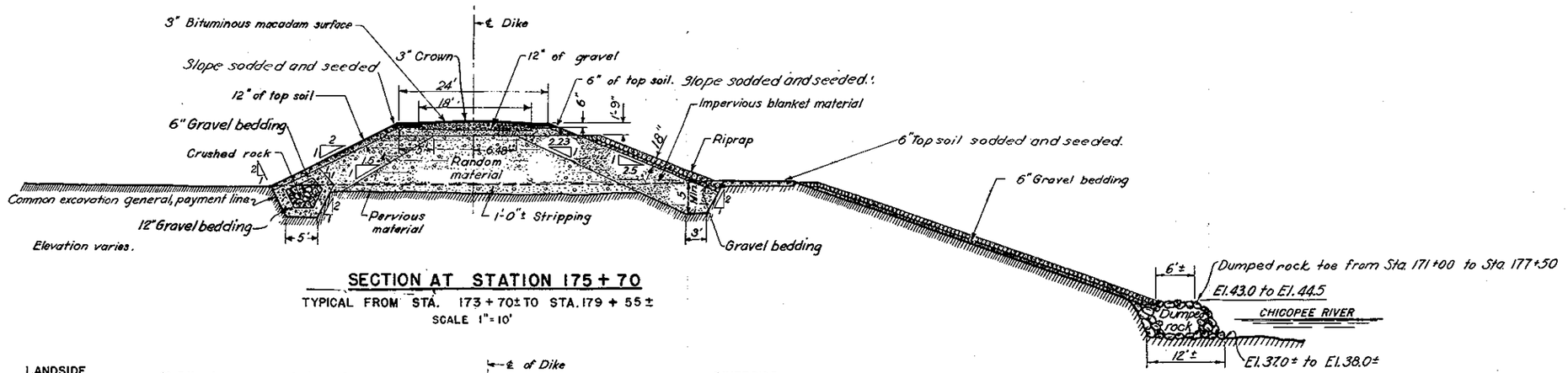
10' 0 10' 20'

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

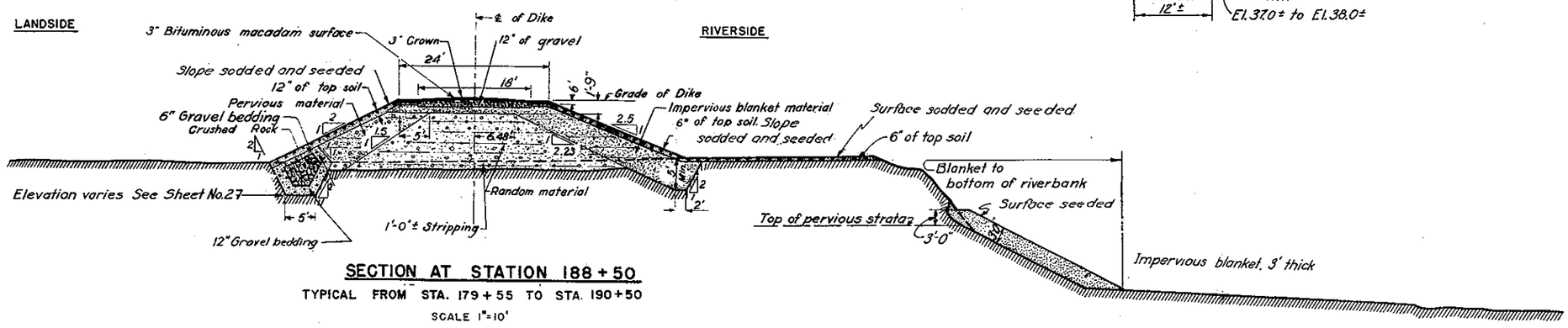
PLATE XIX



SECTION AT STATION 175 + 70

TYPICAL FROM STA. 173 + 70± TO STA. 179 + 55±

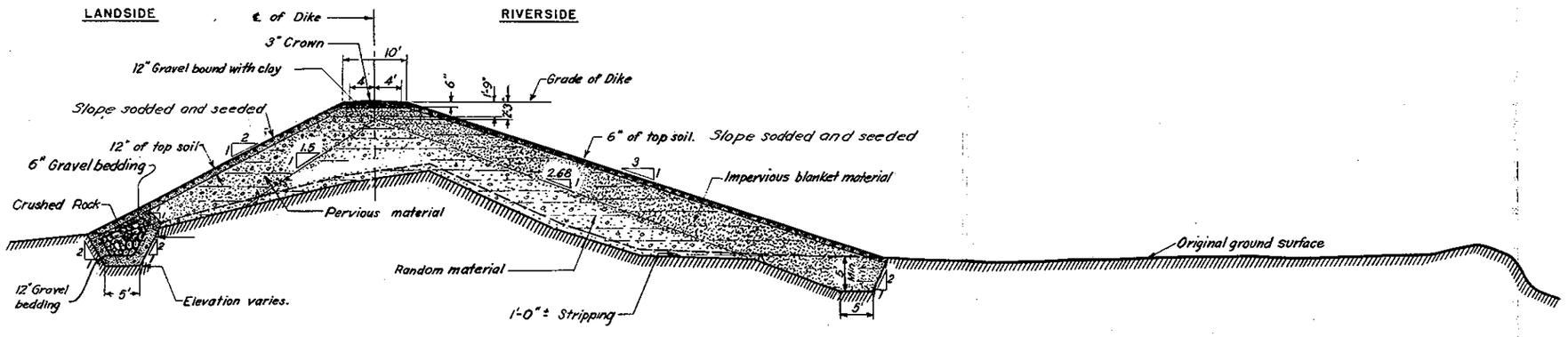
SCALE 1"=10'



SECTION AT STATION 188 + 50

TYPICAL FROM STA. 179 + 55 TO STA. 190+50

SCALE 1"=10'



SECTION AT STATION 200 + 25

TYPICAL FROM STA. 198 + 97± TO STA. 202 + 40±

SCALE 1" = 10'

NOTES:

Elevations refer to mean sea level datum.

Dike grade is at shoulders of dike crown, gravel roadway has 3" crown above dike grade.

For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

CHICOPEE DIKE

FISCAL YEAR 1939 SECTION

EMBANKMENT DETAILS NO.3

CHICOPEE, MASS.

CONNECTICUT & CHICOPEE RIVERS, MASSACHUSETTS.

IN 42 SHEETS SCALE 1 IN. = 10 FT. SHEET NO. 23

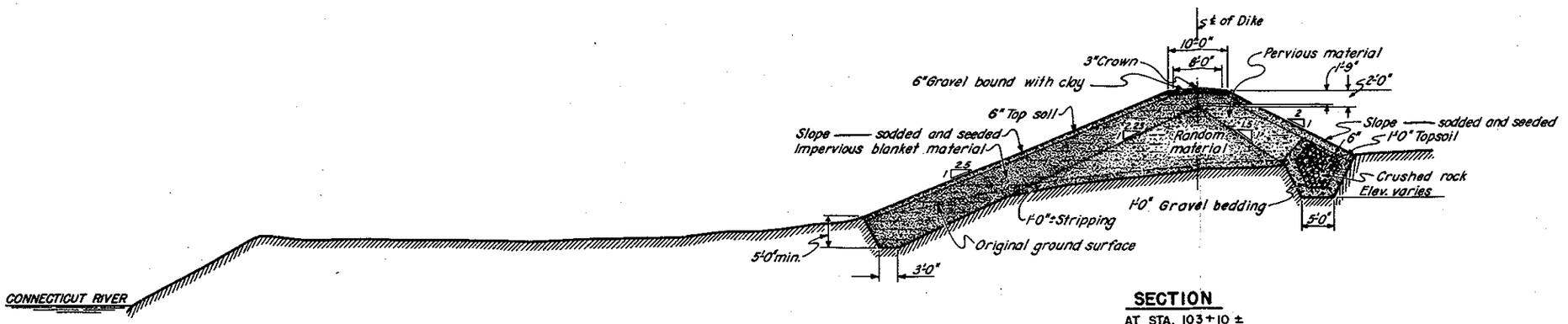
10' 0 10 20'

U. S. ENGINEER OFFICE, PROVIDENCE, R.I.,

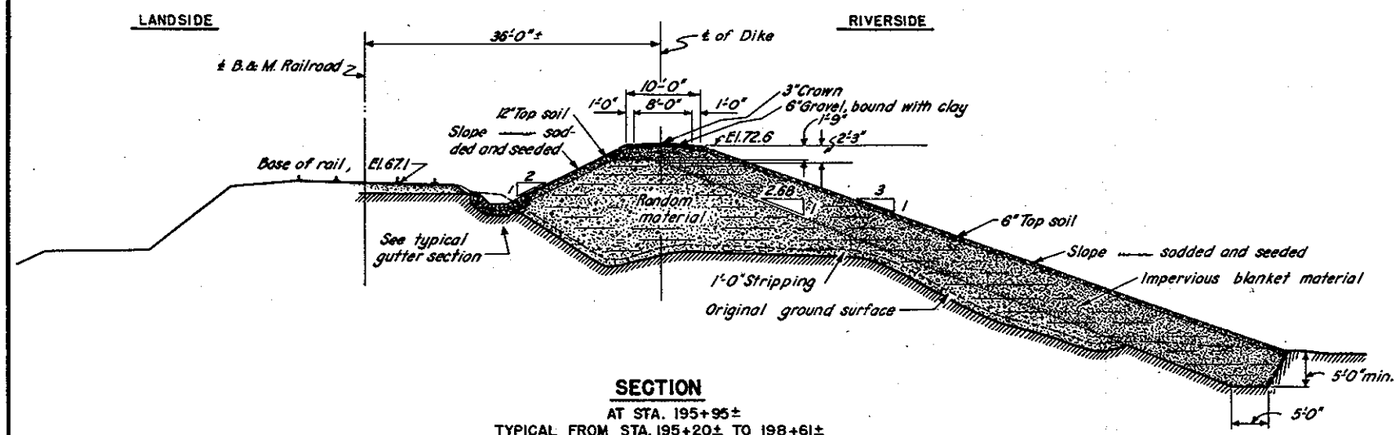
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

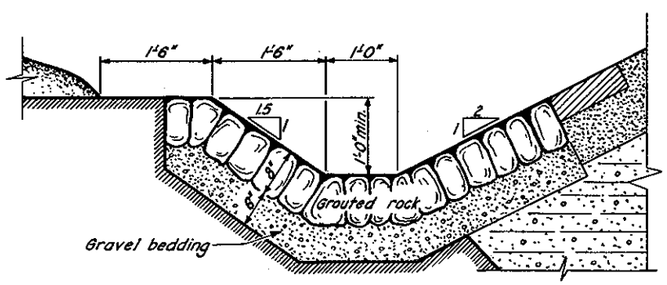
PLATE XX



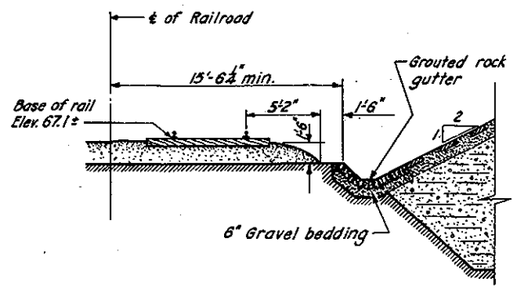
SECTION
AT STA. 103+10 ±
SCALE: 1"=10'-0"



SECTION
AT STA. 195+95±
TYPICAL FROM STA. 195+20± TO 198+61±
SCALE: 1"= 10'-0"



DETAIL OF GUTTER
SCALE: 1"=1'-0"
1' 0 1' 2'



TYPICAL GUTTER SECTION
SCALE 1"=5'-0"
5' 0 5' 10'

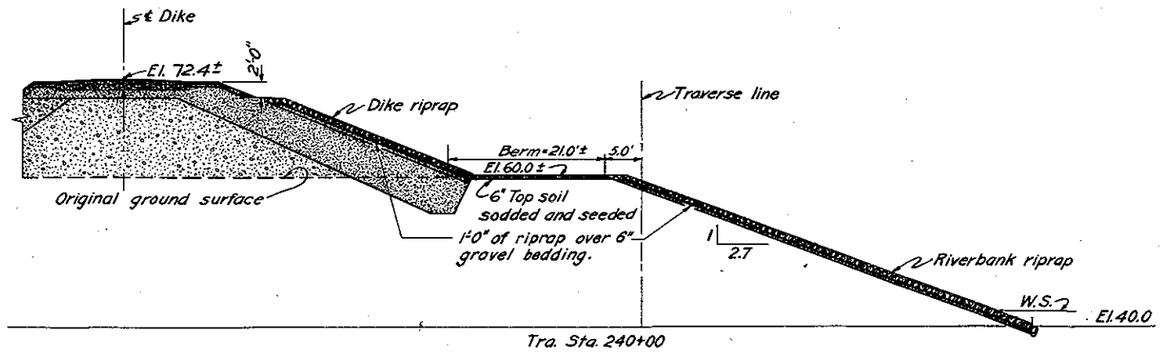
NOTES

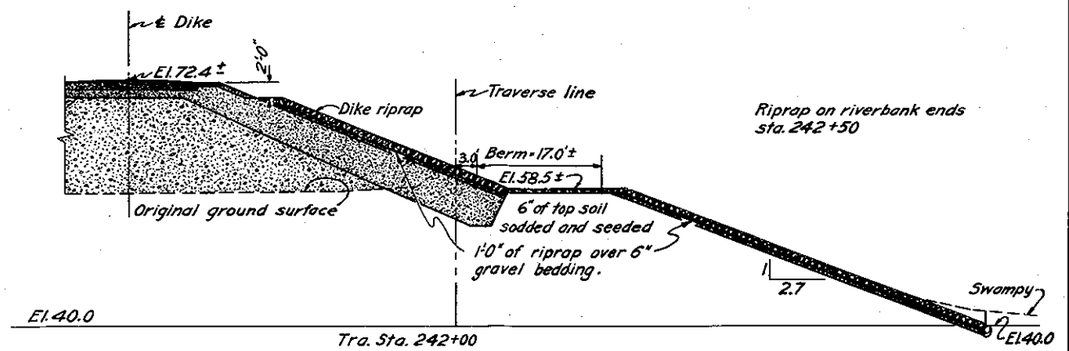
All elevations refer to Mean Sea Level datum.

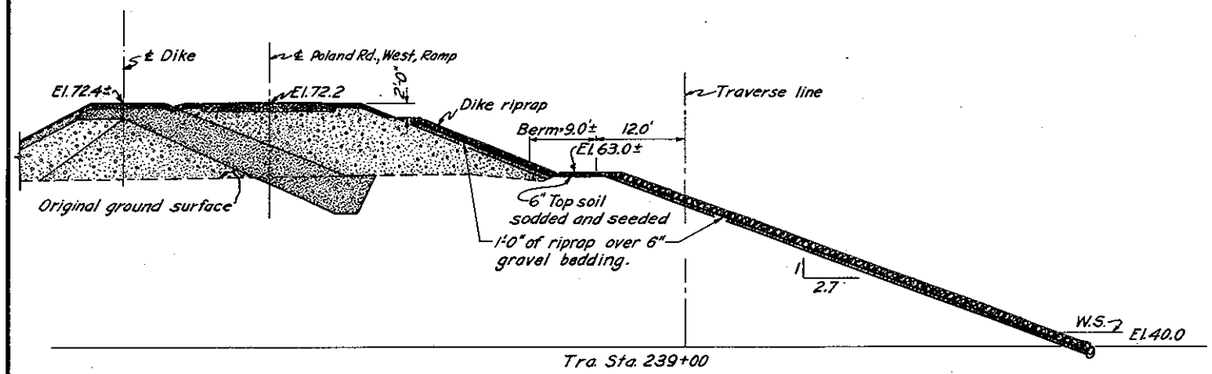
For further details see contract drawings furnished city.

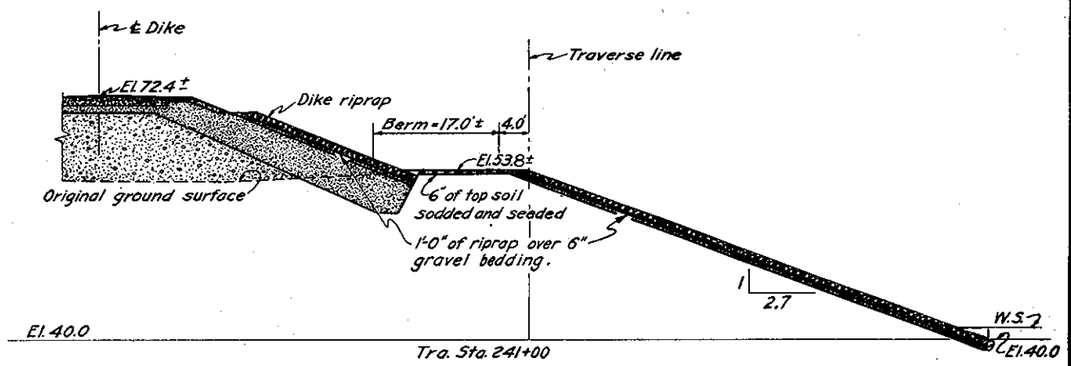
CONNECTICUT RIVER FLOOD CONTROL
CHICOPEE DIKE
FISCAL YEAR 1939 SECTION
EMBANKMENT DETAILS NO. 4
CHICOPEE, MASS.
CONNECTICUT & CHICOPEE RIVERS MASSACHUSETTS
SCALE: 1 IN. = 10 FT.
10' 0 10' 20'
U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,
OPERATION AND MAINTENANCE MANUAL
CHICOPEE, MASS

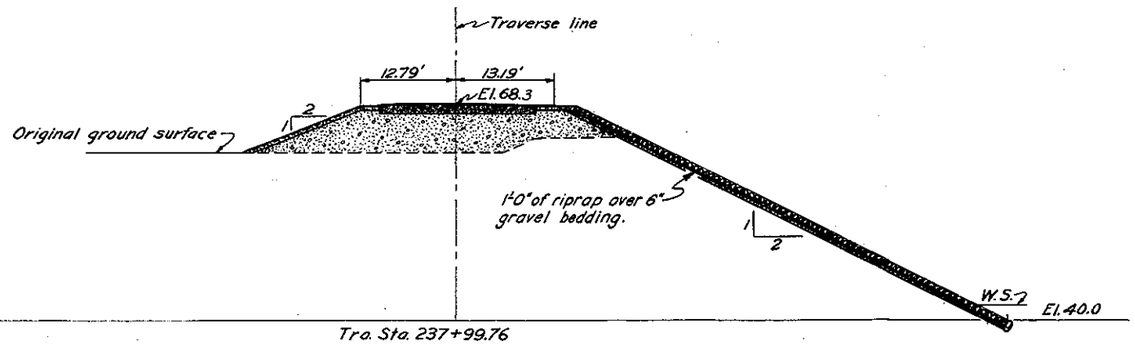
PLATE XXI

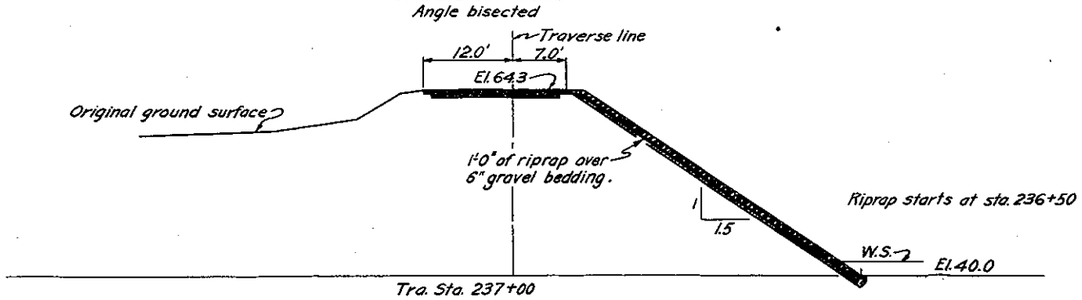












NOTES:

Elevations refer to Mean Sea Level datum.

Bank graded to slope shown and riprapped to El. 40.0.

CONNECTICUT RIVER FLOOD CONTROL

CHICOPEE DIKE

FISCAL YEAR 1939 SECTION

CHICOPEE RIVER BANK IMPROVEMENT

CHICOPEE, MASS.

CONNECTICUT & CHICOPEE RIVERS MASSACHUSETTS

SCALE 1IN = 10 FT.

U. S. ENGINEER OFFICE, PROVIDENCE, R.I.

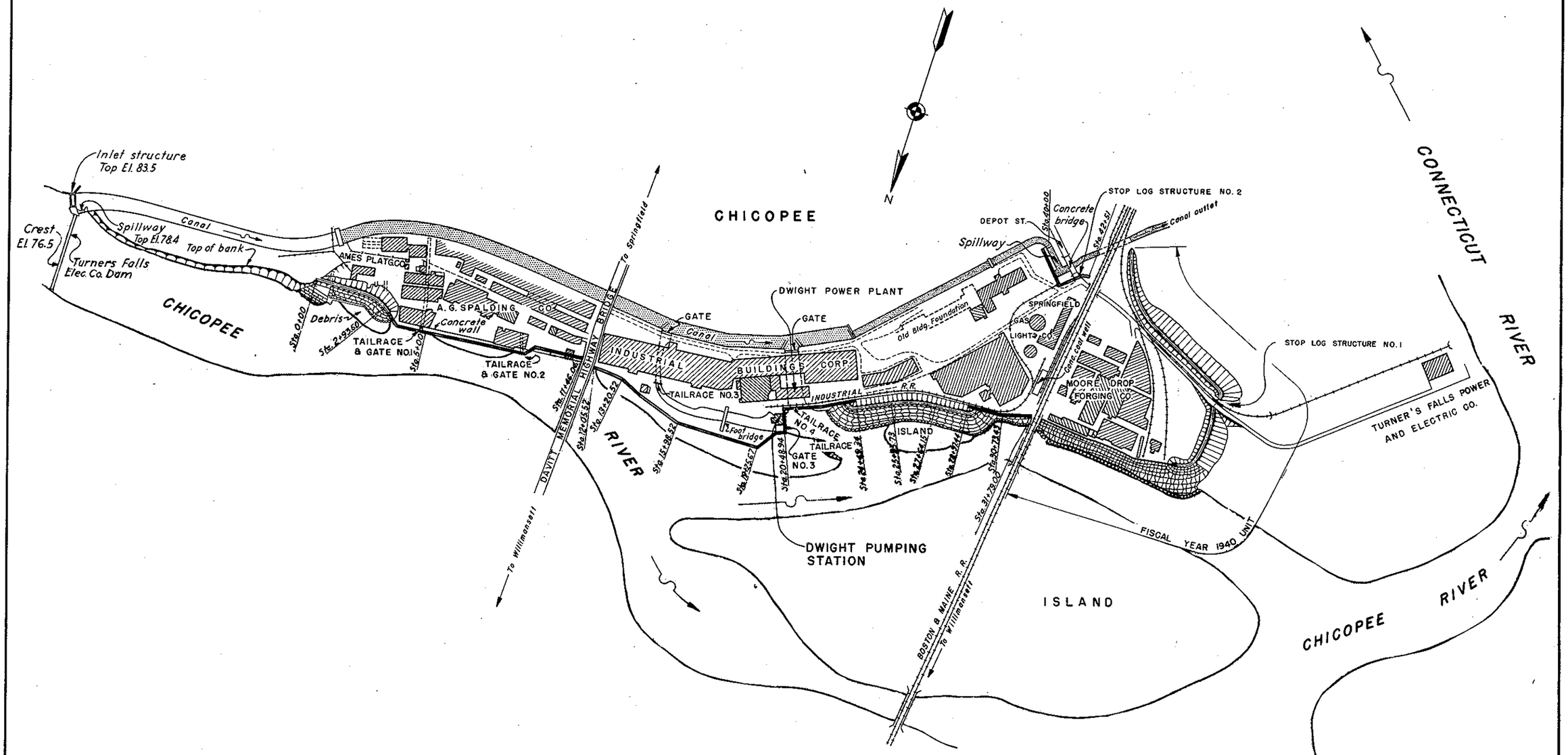
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE XXII

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY



CONNECTICUT RIVER FLOOD CONTROL

DIKE-SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

GENERAL PLAN

CONNECTICUT RIVER — CHICOPEE, MASS.

SCALE: 1 IN = 200 FT

200' 0 200' 400'

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

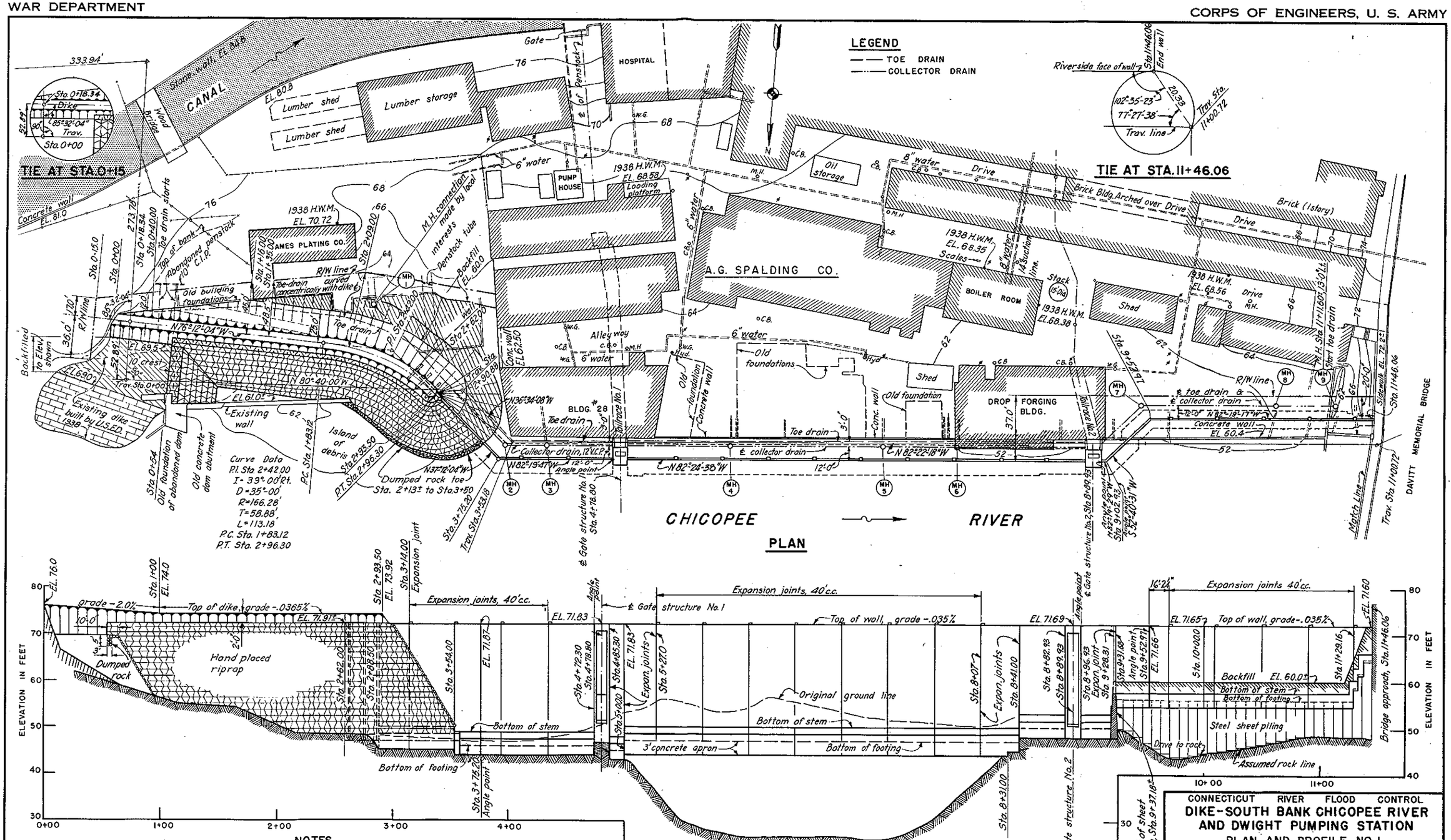
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE XXIII

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY



PLAN

PROFILE ALONG £ DIKE AND RIVERSIDE FACE OF WALL

SCALES: HOR. 1" = 40', VERT. 1" = 10'

NOTES

Elevations refer to Mean Sea Level Datum.
Contour interval is two feet.
Stations marked "Trav. Sta. are along U.S. Engineer Traverse.
For further details see contract drawings furnished city.
Wall Station line is riverside face of wall.

CONNECTICUT RIVER FLOOD CONTROL

DIKE - SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

PLAN AND PROFILE NO. 1

STA. 0+00 TO STA. 11+46.33

CONNECTICUT RIVER — CHICOPEE, MASS.

SCALE: 1 IN. = 40 FT.

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

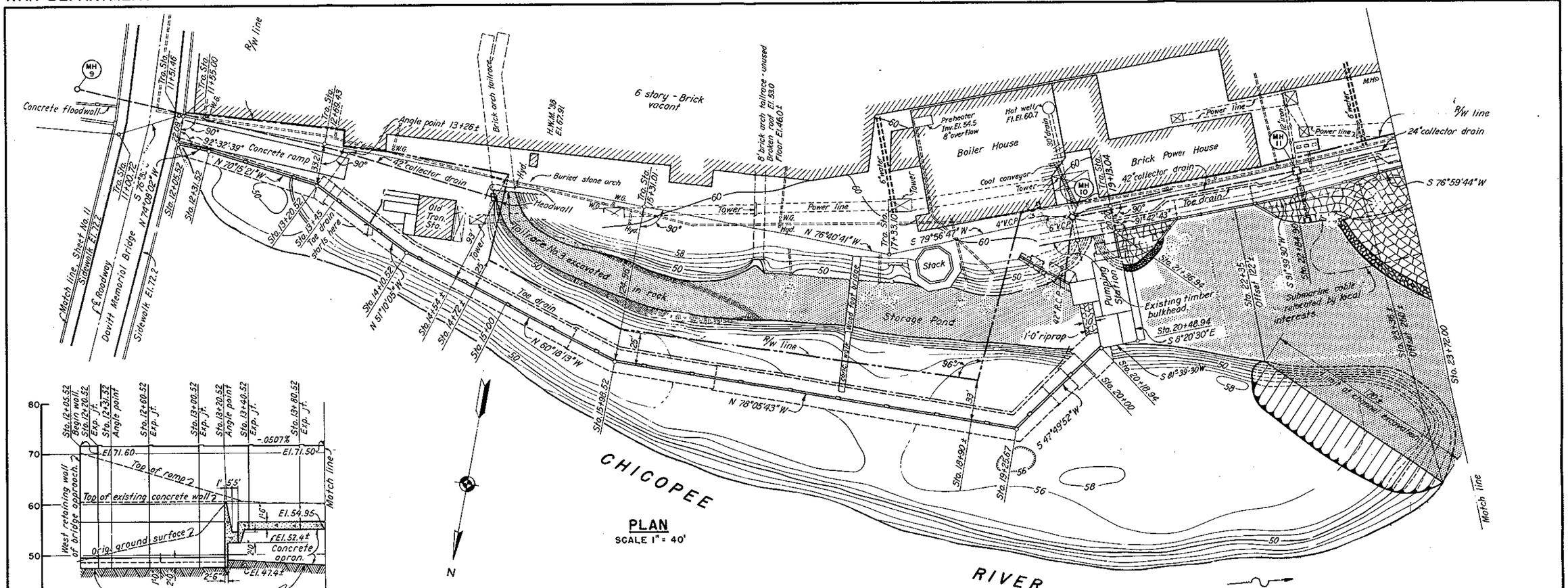
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE XXIV

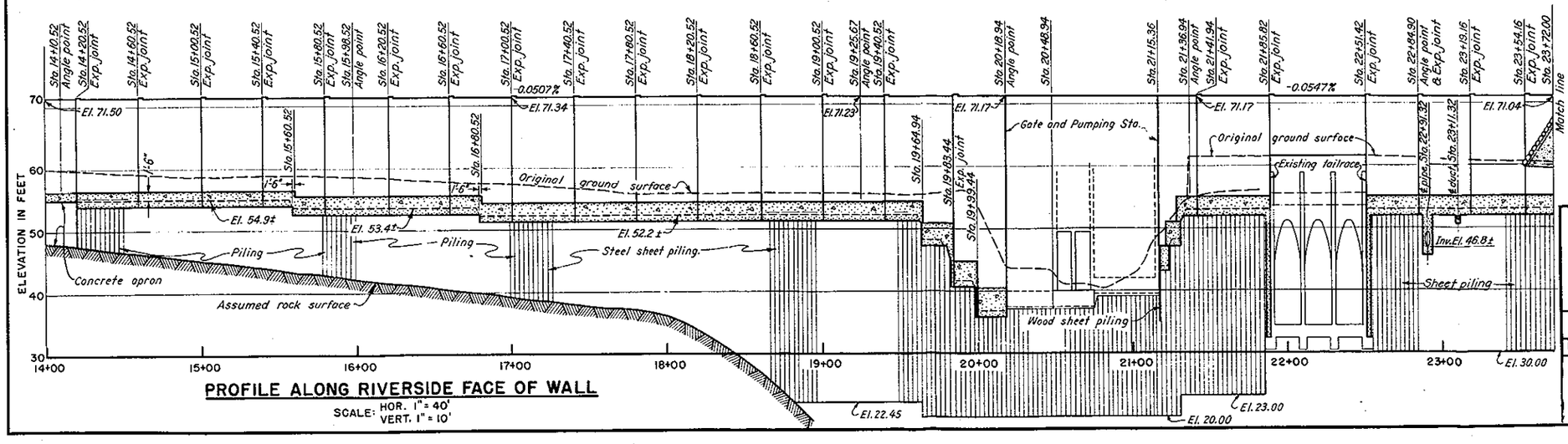
WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY



PLAN

SCALE 1" = 40'



PROFILE ALONG RIVERSIDE FACE OF WALL

SCALE: HOR. 1" = 40'
VERT. 1" = 10'

NOTES

Elevations refer to Mean Sea Level Datum.
Wall station line is riverside face of wall.
Contour interval is two feet.
Stations marked "Tra. Sta." are along U.S. Engineers traverse.
For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

DIKE-SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

PLAN AND PROFILE NO. 2

STA. 11+46.33 TO STA. 23+72.0

CONNECTICUT RIVER — CHICOPEE, MASS.

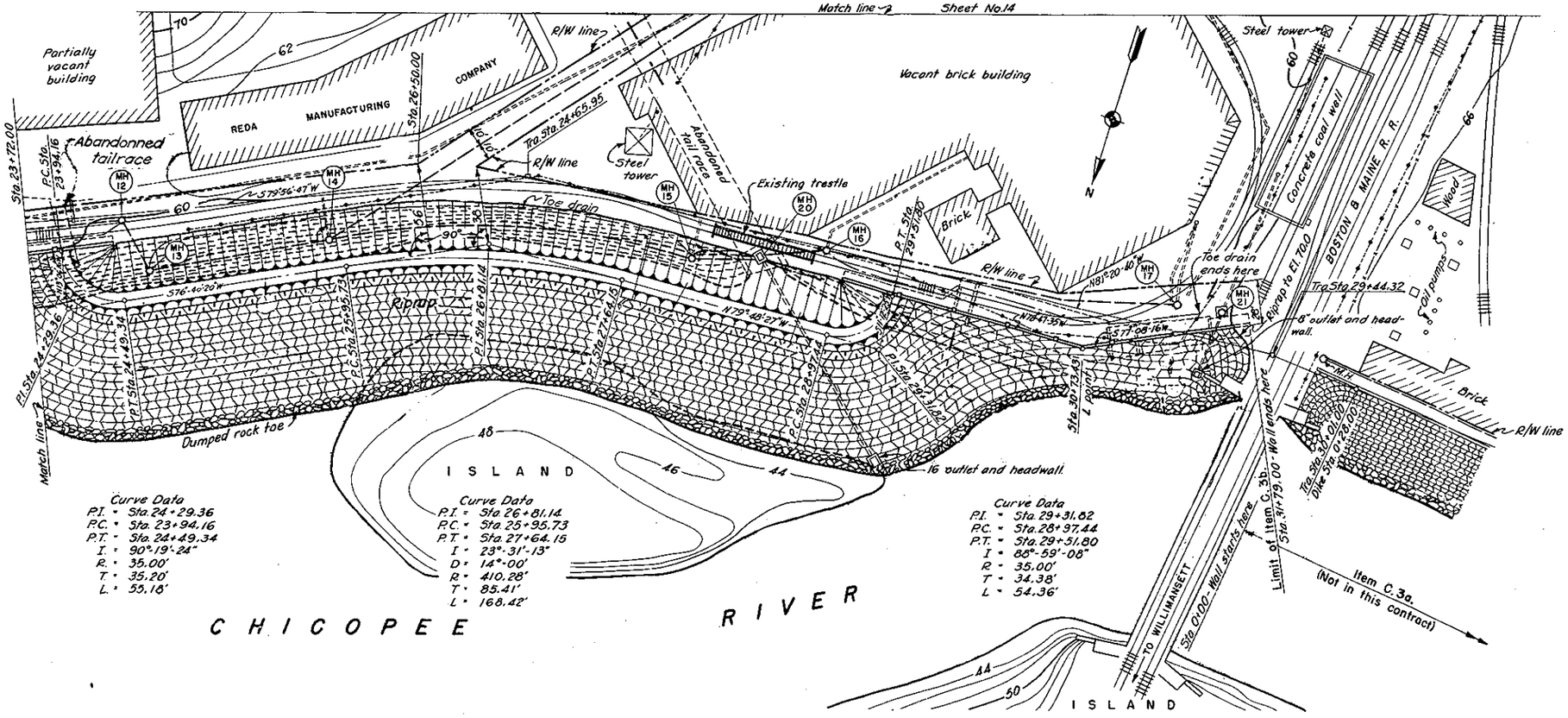
SCALE: 1" = 40 FT.

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

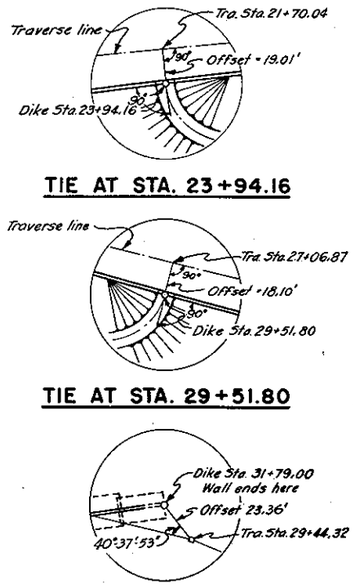
CHICOPEE, MASS

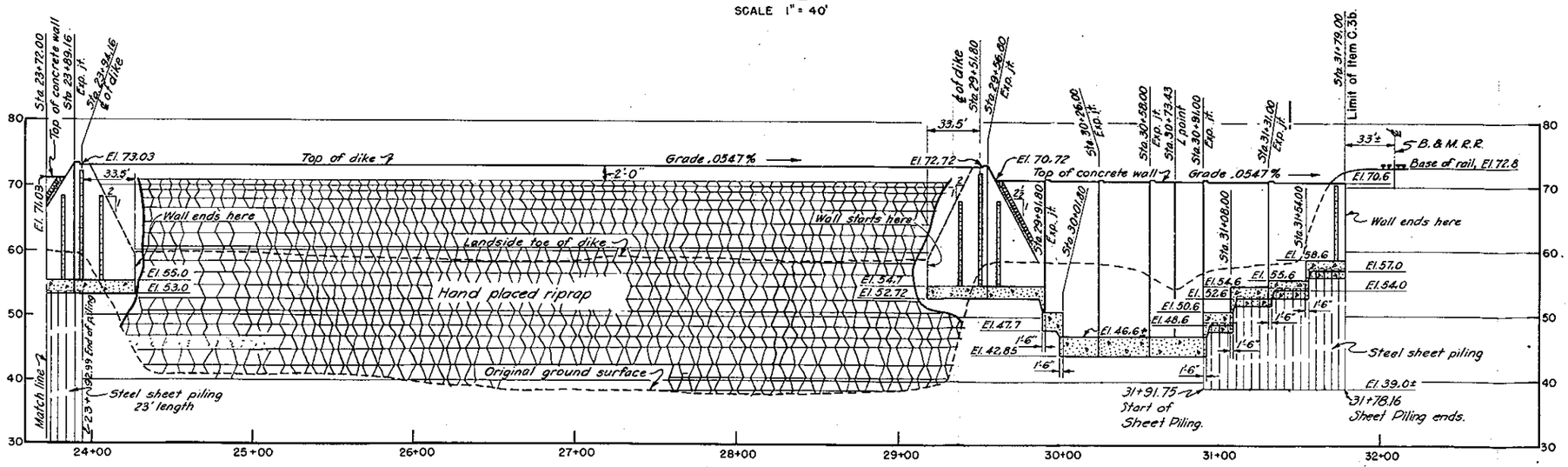
PLATE XXV



PLAN

SCALE 1" = 40'





PROFILE ALONG ℄ DIKE AND RIVERSIDE FACE OF WALL

SCALE: HOR. 1" = 40'
VERT. 1" = 10'

NOTES:

Elevations refer to Mean Sea Level Datum.
Stations marked "Tra. Sta." are along U.S. Engineer Traverse.
Contour interval is two feet.
Wall station line is riverside face of wall.
For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

DIKE—SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

PLAN AND PROFILE NO. 3

STATION 23+72.0 TO STATION 31+79.0

CONNECTICUT RIVER — CHICOPEE, MASS.

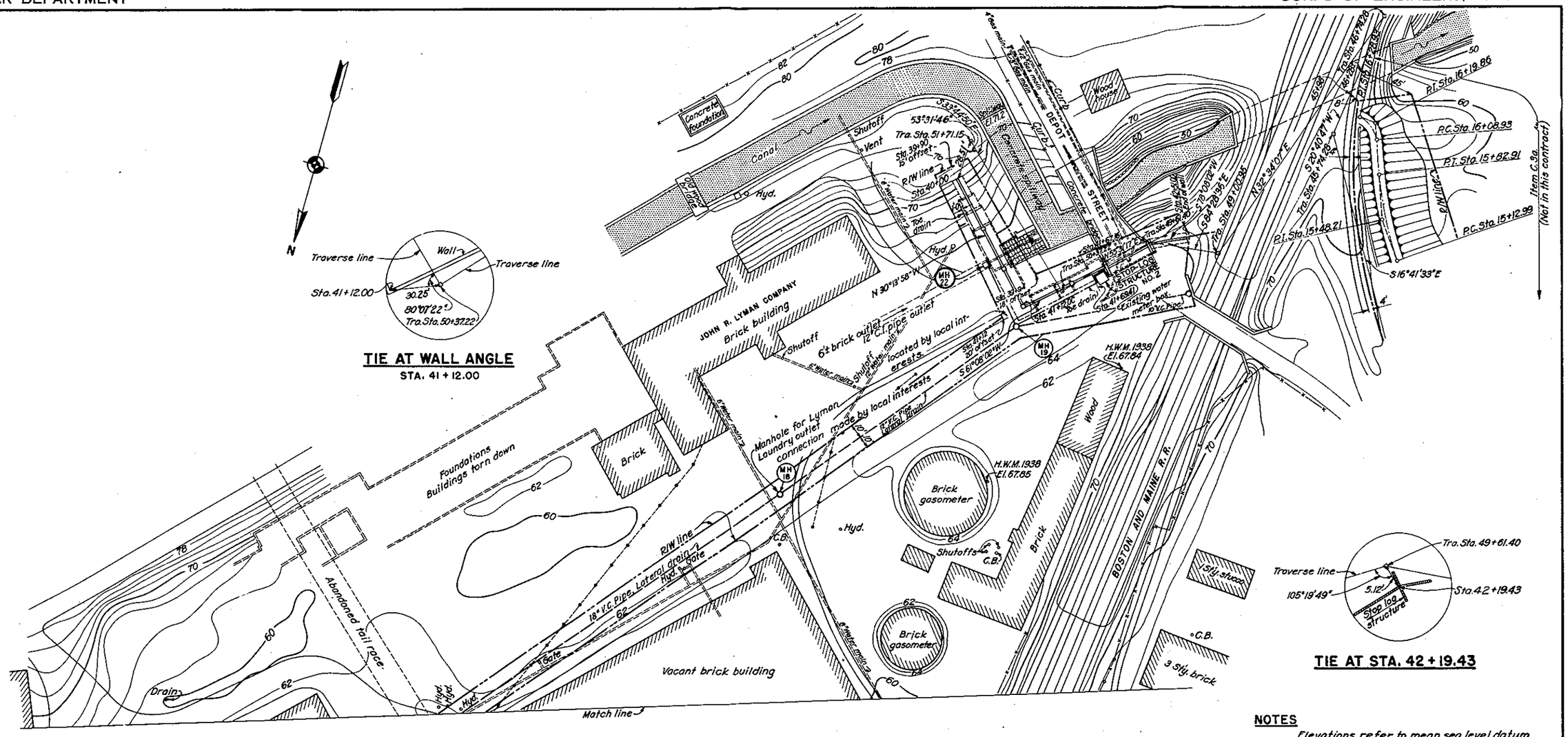
SCALE: 1 IN. = 40 FT.

U. S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

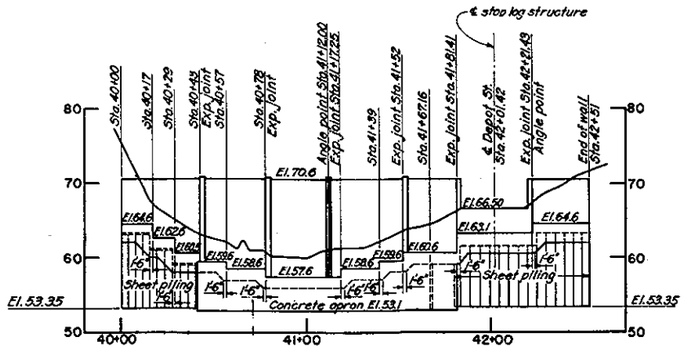
CHICOPEE, MASS

PLATE XXVI

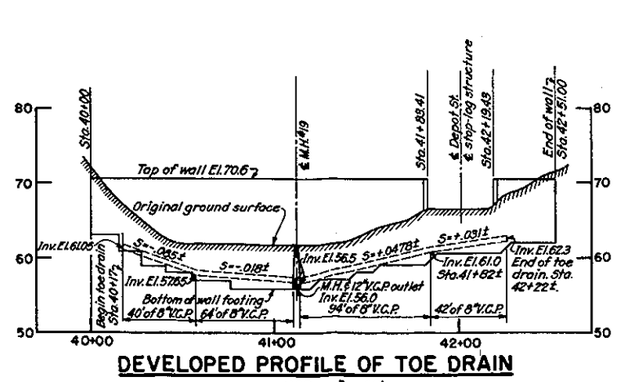


TIE AT WALL ANGLE
STA. 41 + 12.00

TIE AT STA. 42 + 19.43



DEVELOPED SECTION
SCALE: HOR. 1" = 40'
VERT. 1" = 10'



DEVELOPED PROFILE OF TOE DRAIN
SCALE: HOR. 1" = 40'
VERT. 1" = 10'

NOTES

Elevations refer to mean sea level datum.
Wall station line is riverside face of wall.
Contour interval is two feet.
Stations marked "Tra. Sta." are along U.S. Engineer's traverse.
For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

DIKE – SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

PLAN AND PROFILE NO. 4
STATION 40+00.0 TO STATION 42+51.0

CONNECTICUT RIVER — CHICOPEE, MASS.

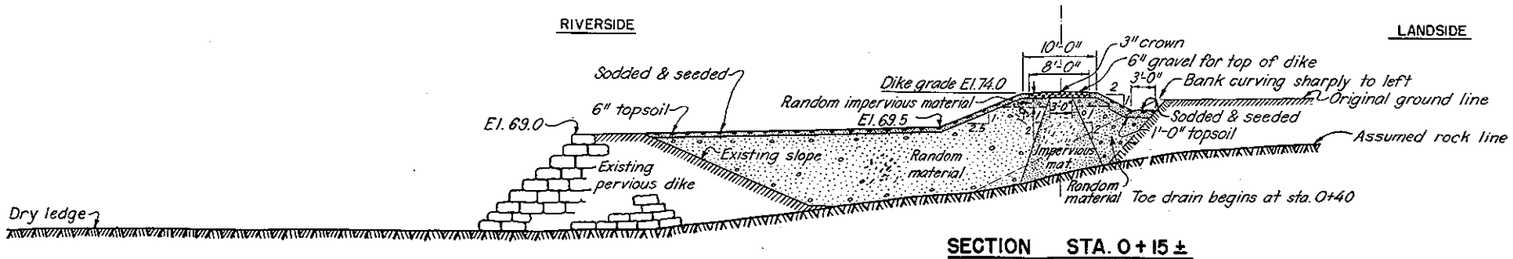
SCALE: 1 IN. = 40 FT.

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

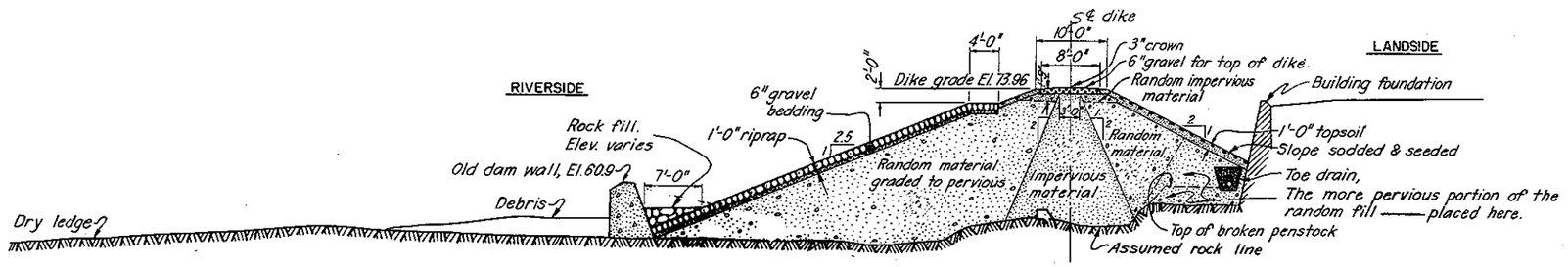
CHICOPEE, MASS.

PLATE XXVII



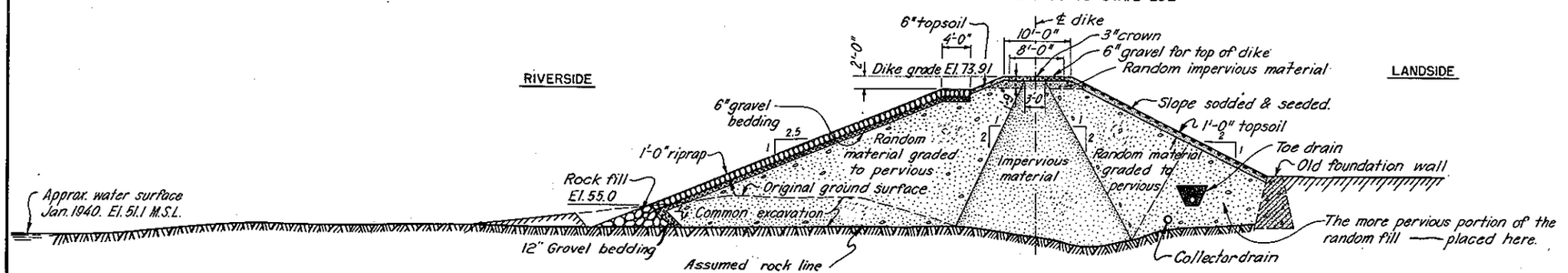
SECTION STA. 0 + 15 ±

TYPICAL FROM STA. 0+00 TO STA. 0+65 ±



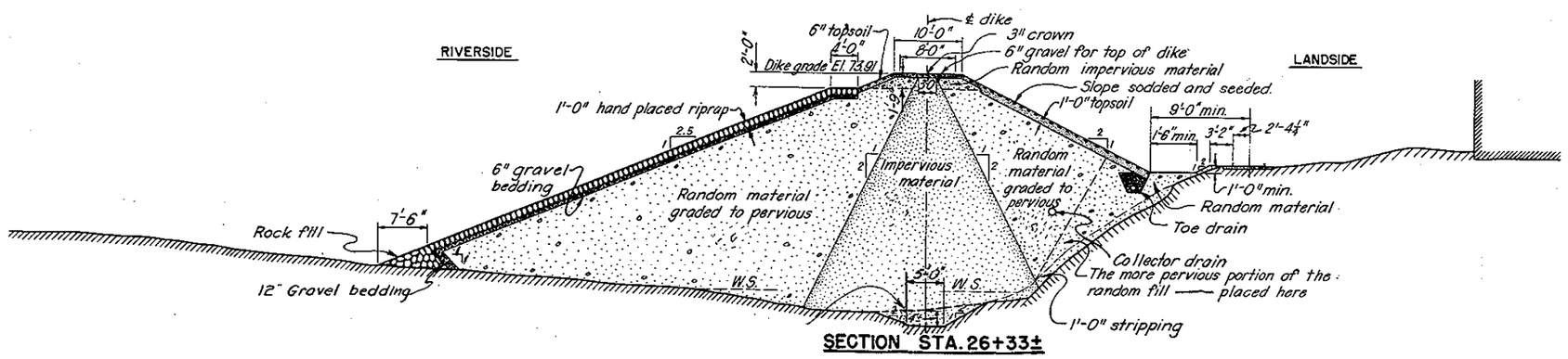
SECTION STA. 1 + 15 ±

TYPICAL FROM STA. 0+65 ± TO STA. 2+25 ±



SECTION STA. 2 + 60 ±

TYPICAL FROM STA. 2+25 ± TO STA. 2+52.0 ±



SECTION STA. 26+33 ±

TYPICAL FROM STA. 23+94 ± TO STA. 29+52 ±

NOTES

Elevations refer to Mean Sea Level Datum.

CONNECTICUT RIVER FLOOD CONTROL

DIKE-SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

EMBANKMENT DETAILS

CONNECTICUT RIVER — CHICOPEE, MASS.

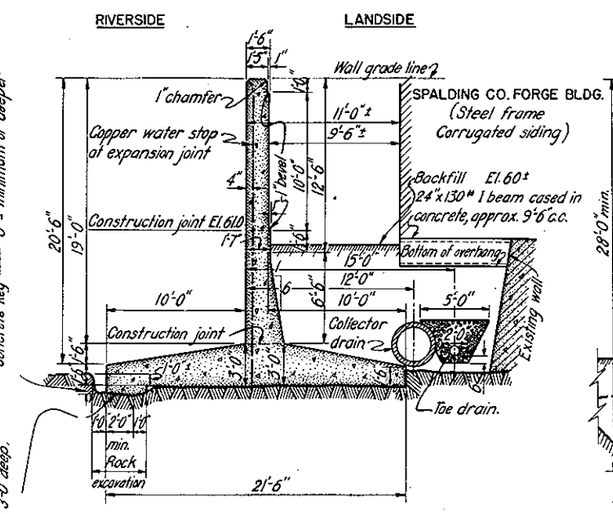
SCALE 1 IN. = 10 FT.

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,

OPERATION AND MAINTENANCE MANUAL

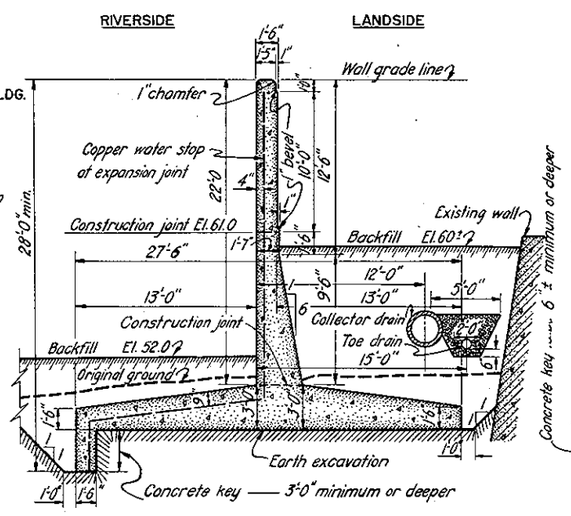
CHICOPEE, MASS

PLATE XXVIII



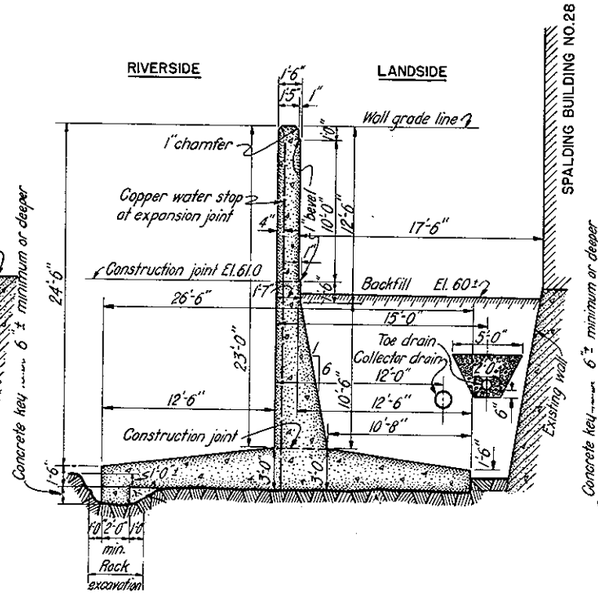
19'-0" WALL SECTION

TYPICAL FROM STA. 8+41.0 TO STA. 8+82.93
AND FROM STA. 8+96.93 TO STA. 9+28.31±



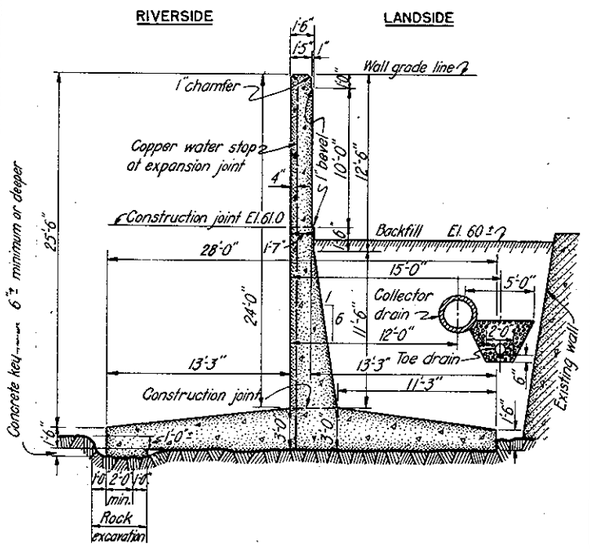
22'-0" WALL SECTION

TYPICAL FROM STA. 5+00 TO STA. 8+41.0



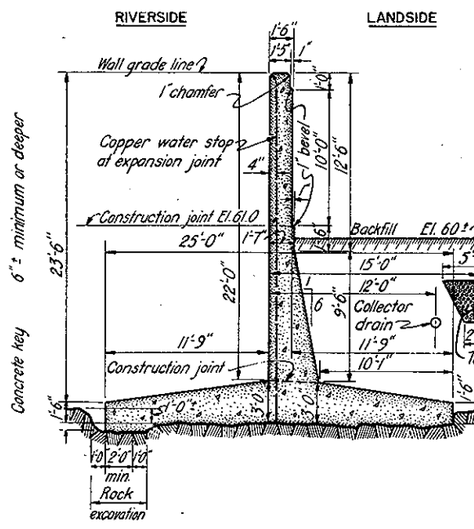
23'-0" WALL SECTION

TYPICAL FROM STA. 3+54.0 TO STA. 4+72.30



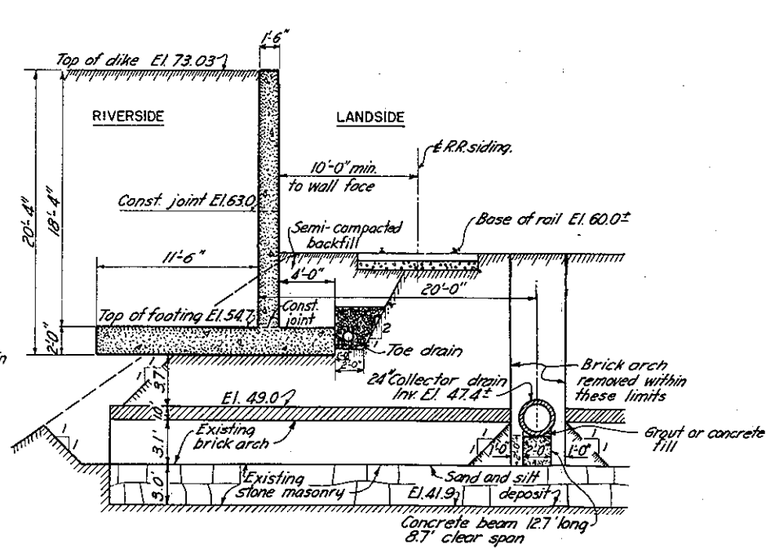
24'-0" WALL SECTION

TYPICAL FROM STA. 4+85.30 TO STA. 5+00



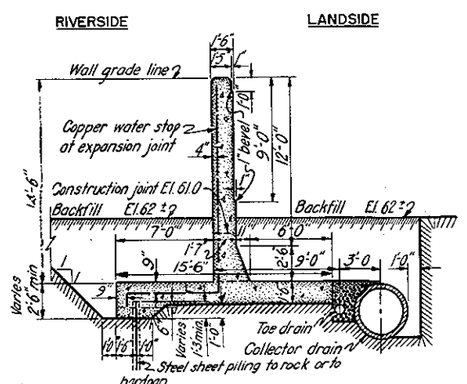
22'-0" WALL SECTION

TYPICAL FROM STA. 2+88.5 TO STA. 3+54.0



SECTION ALONG ℄ OF TAILRACE

ABANDONED TAILRACE STA. 23+99.26
SCALE: 3/16" = 1'-0"



14'-6" WALL SECTION

TYPICAL FROM STA. 9+31.68 TO STA. 11+26.23
STEEL SHEET PILING FROM STA. 9+37.18± TO STA. 11+26.23

NOTES

Elevations refer to Mean Sea Level Datum.
Wall station line is riverside face of wall.
For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

DIKE-SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

WALLS

CONCRETE DETAILS NO. 1

CONNECTICUT RIVER — CHICOPEE, MASS.

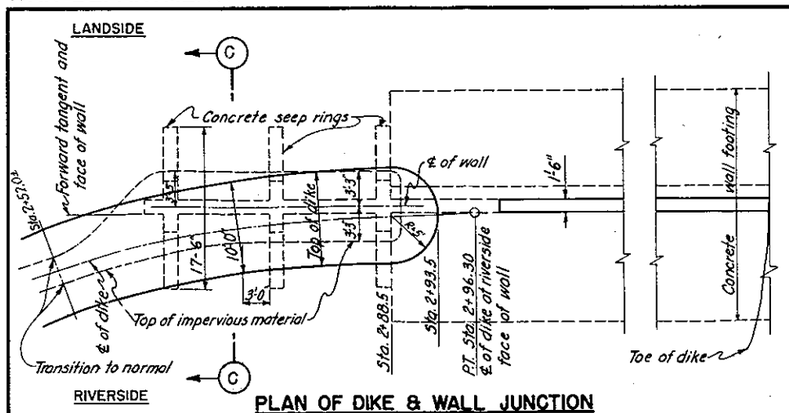
SCALE: 3/16 IN. = 1 FT.

U. S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

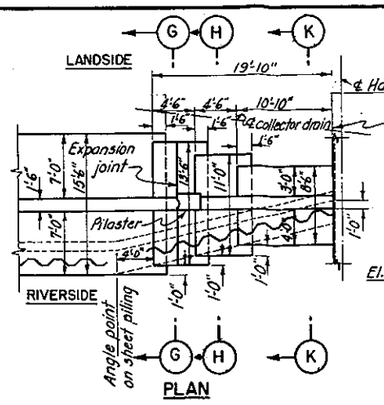
CHICOPEE, MASS

PLATE XXIX

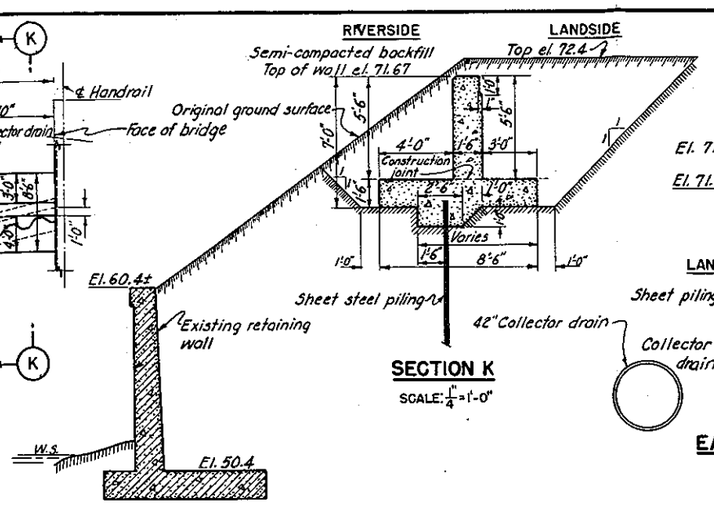


PLAN OF DIKE & WALL JUNCTION

SCALE: 1/8"=1'-0"

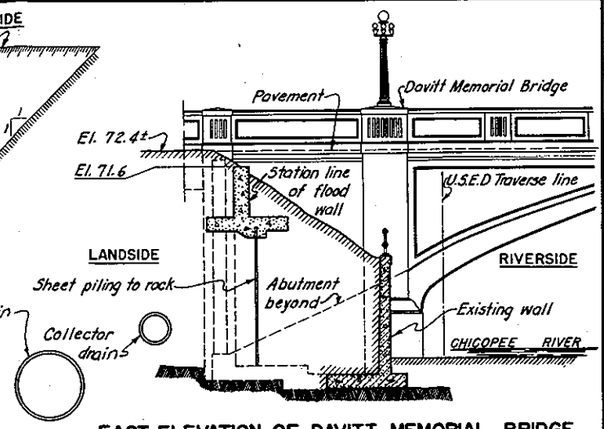


PLAN



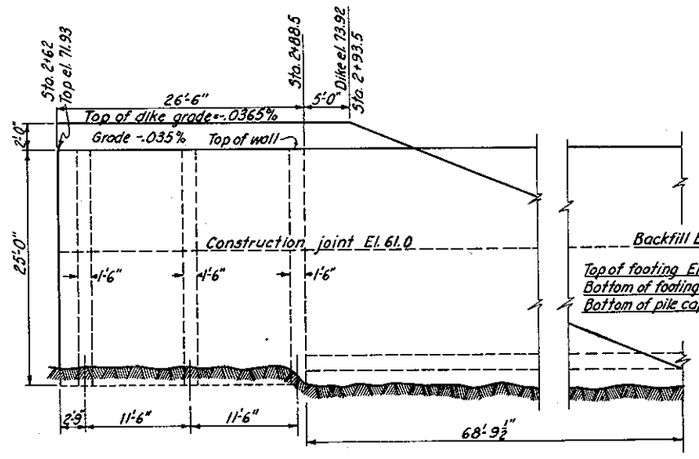
SECTION K

SCALE: 1/4"=1'-0"



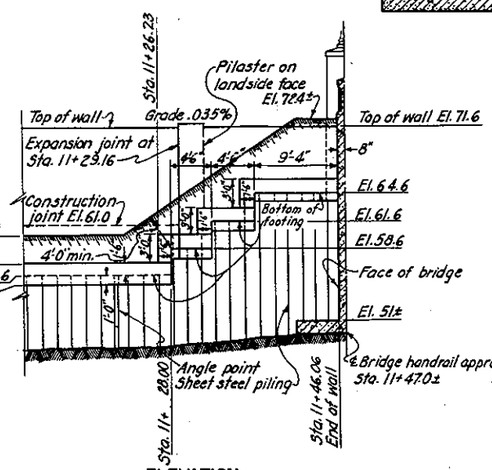
EAST ELEVATION OF DAVITT MEMORIAL BRIDGE

SCALE: 1/8"=1'-0"



ELEVATION, DIKE & WALL JUNCTION

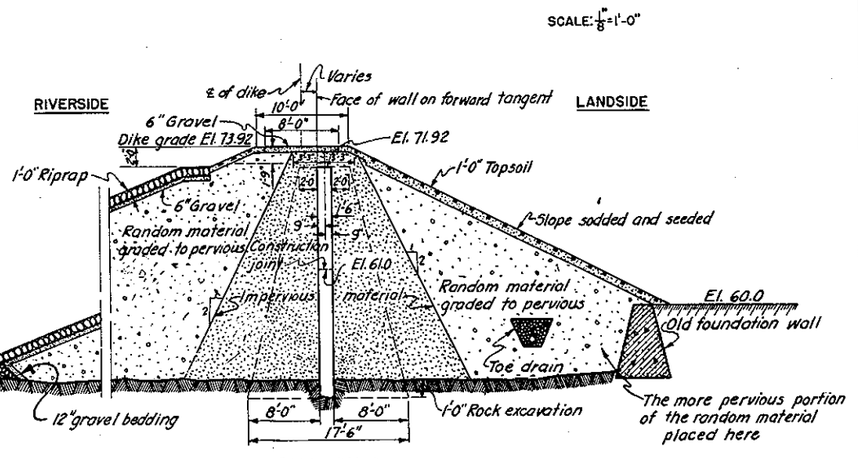
SCALE: 1/8"=1'-0"



ELEVATION

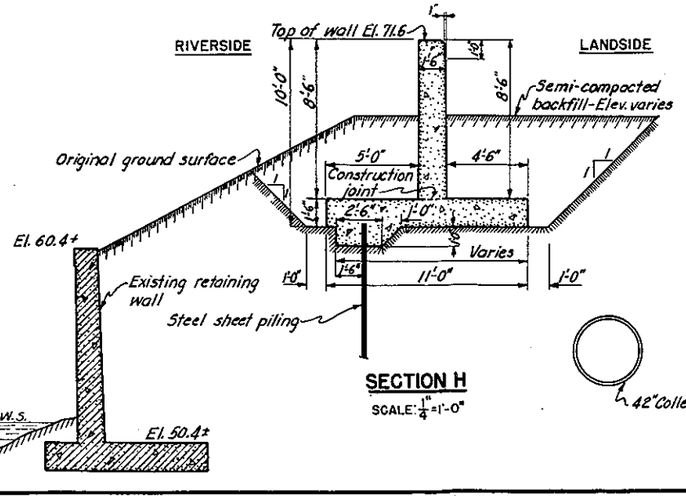
DETAILS OF WALL, FROM STA. 11+12± TO STA. 11+46.06

SCALE: 1/8"=1'-0"



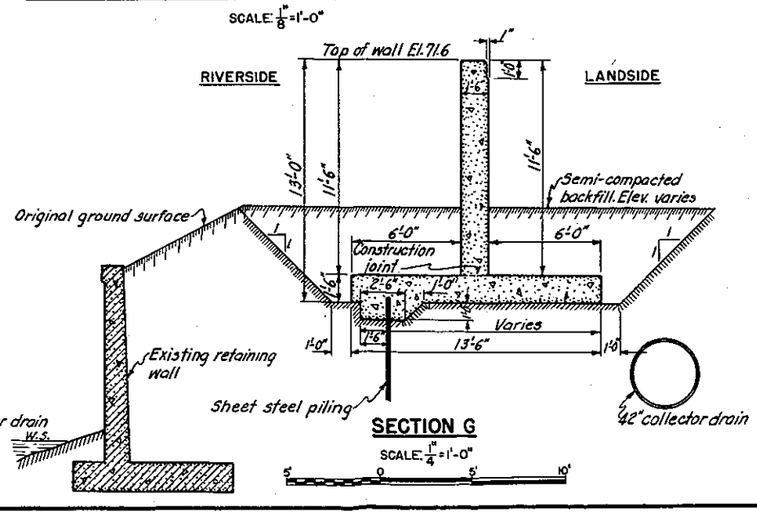
SECTION G

SCALE: 1/8"=1'-0"



SECTION H

SCALE: 1/4"=1'-0"



SECTION G

SCALE: 1/4"=1'-0"

5' 0 5' 10'

NOTES

Elevations refer to Mean Sea Level Datum.

For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

DIKE-SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

WALLS

CONCRETE DETAILS NO. 2

CONNECTICUT RIVER CHICOPEE, MASS.

SCALE: 1/8 IN = 1 FT.

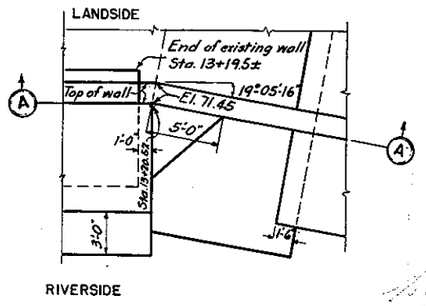
5' 0 5' 10' 15' 20'

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

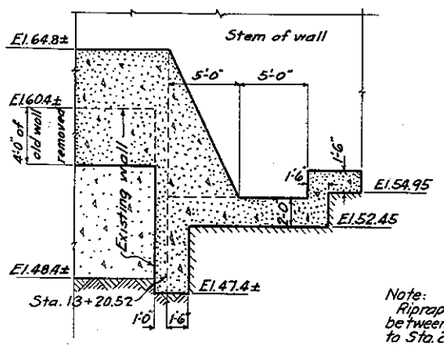
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE XXX

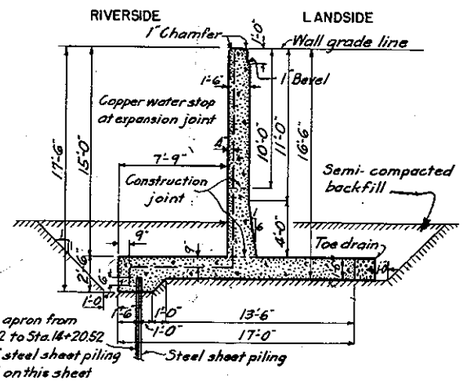


PLAN



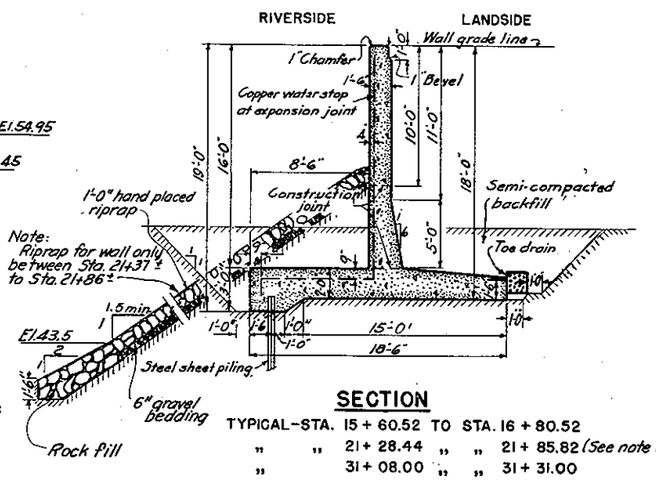
SECTION A

WALL DETAILS AT STA. 13+20±



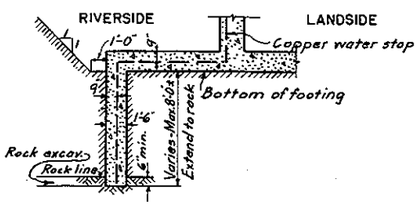
SECTION

TYPICAL–STA. 13 +30.52 TO STA. 15 + 60.52
„ „ 31 + 31.00 „ „ 31+ 54.00



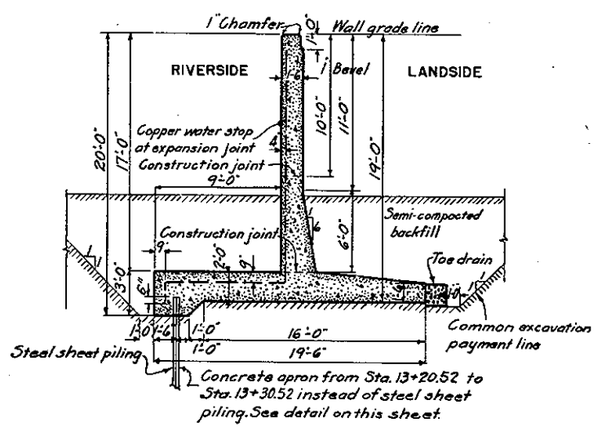
SECTION

TYPICAL–STA. 15 + 60.52 TO STA. 16 + 80.52
„ „ 21+ 28.44 „ „ 21+ 85.82 (See note above)
„ 31+ 08.00 „ „ 31+ 31.00



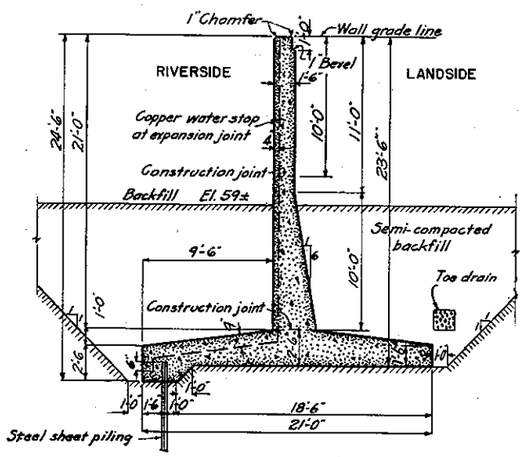
DETAIL OF CONCRETE APRON

USED IN PLACE OF SHEET STEEL PILING
FROM STA. 13 + 20.52 TO STA. 14+ 20.52



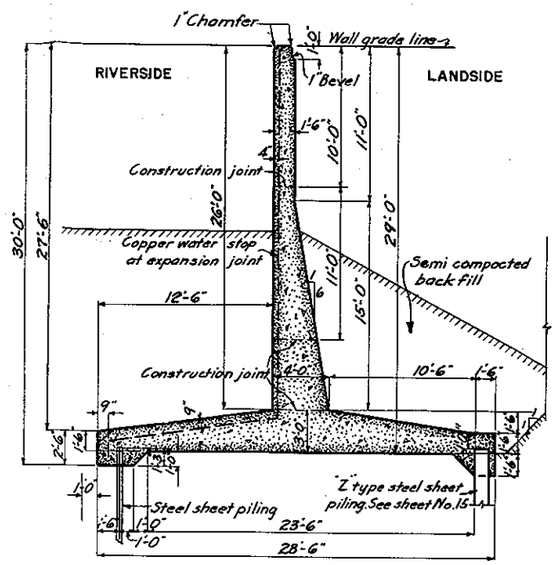
SECTION

TYPICAL–STA. 13 + 20.52 TO STA. 13+30.52
„ „ 16 + 80.52 „ „ 19+64.94



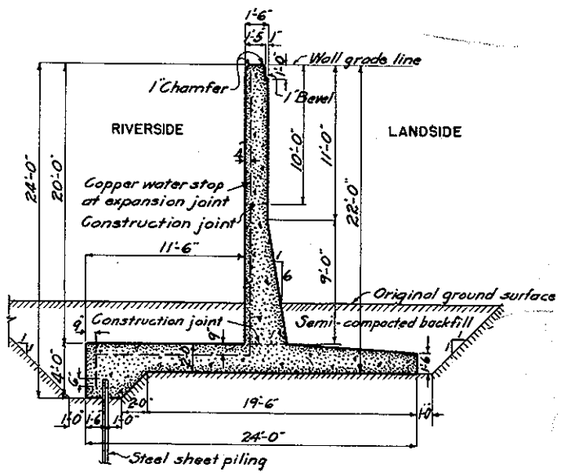
SECTION

TYPICAL–STA. 19 + 64.94 TO STA. 19 + 83.44



SECTION

TYPICAL–STA. 19 + 83.44 TO STA. 19 + 99.44



SECTION

TYPICAL–STA. 30 + 91.00 TO STA. 31+08.00

NOTES:

Elevations refer to Mean Sea Level Datum.

For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

DIKE–SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

WALLS

CONCRETE DETAILS NO. 4

CONNECTICUT RIVER CHICOPEE, MASS.

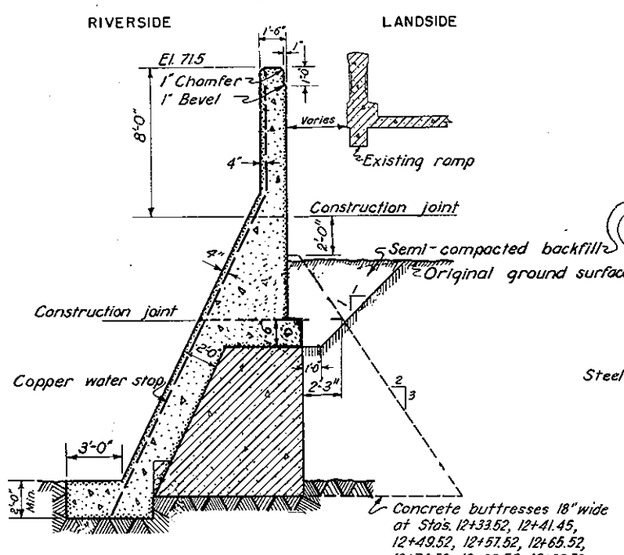
SCALE: 3/16 IN. = 1 FT.

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

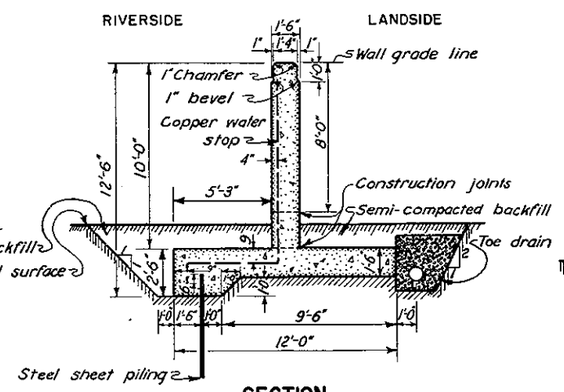
CHICOPEE, MASS

PLATE XXXI



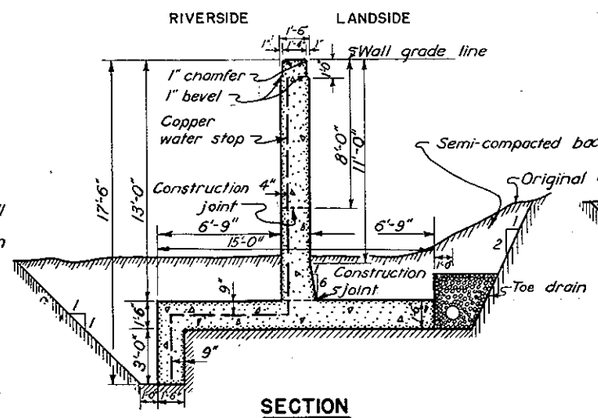
SECTION

TYPICAL FROM STA. 12+31.52 TO STA. 13+20.52



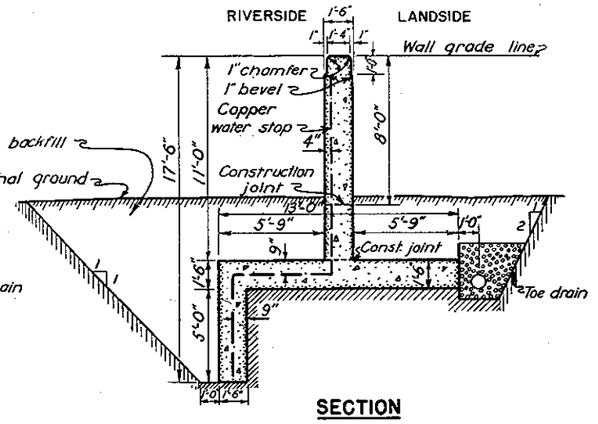
SECTION

TYPICAL FROM STA. 40+29 TO STA. 40+43
TYPICAL FROM STA. 41+52 TO STA. 41+69.41



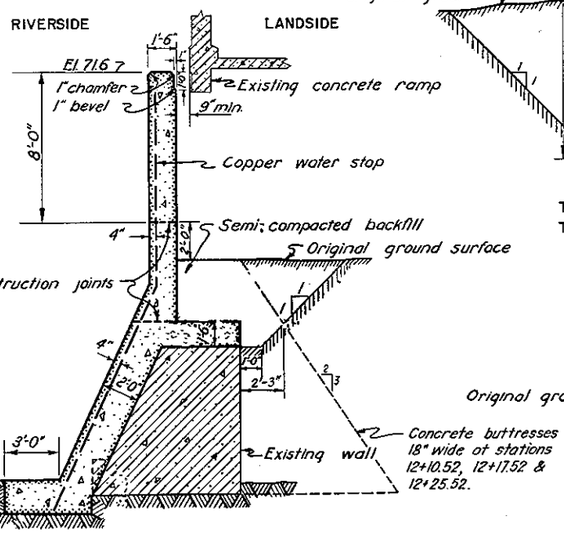
SECTION

TYPICAL FROM STA. 40+78 TO STA. 41+17.25



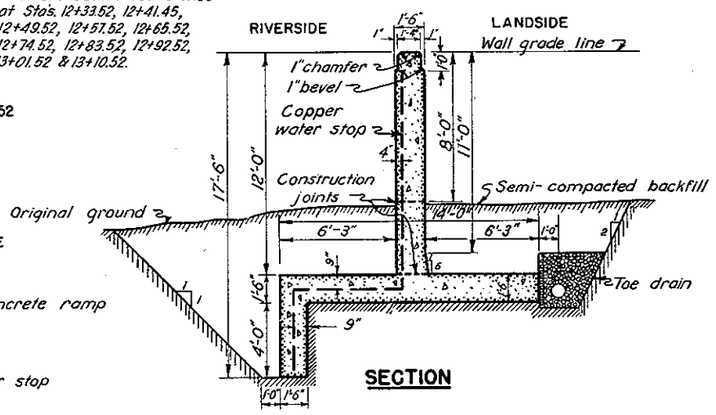
SECTION

TYPICAL FROM STA. 40+43 TO STA. 40+57
TYPICAL FROM STA. 41+39.00 TO STA. 41+52



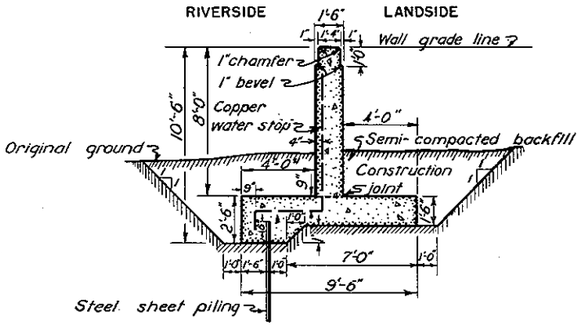
SECTION AT STA. 12+05.52

TRANSITION TO SECTION FROM STA. 12+05.52 TO STA. 12+31.52



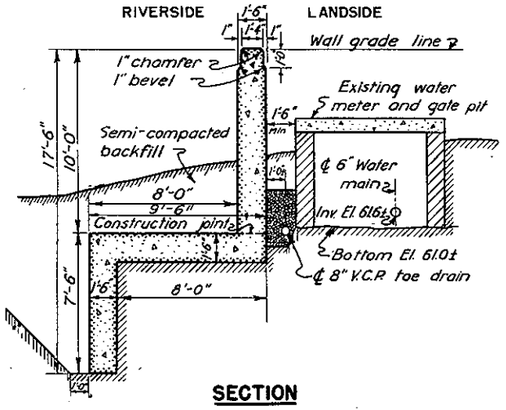
SECTION

TYPICAL FROM STA. 40+57 TO STA. 40+78
TYPICAL FROM STA. 41+17.25 TO STA. 41+39.00



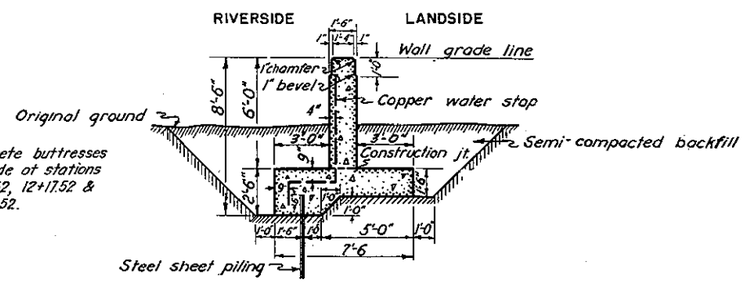
SECTION

TYPICAL FROM STA. 40+17 TO STA. 40+29



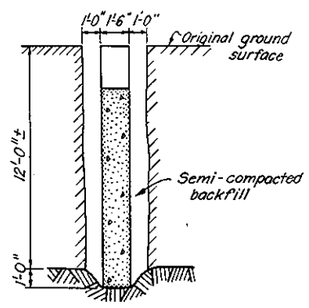
SECTION

TYPICAL FROM STA. 41+69.41 TO STA. 41+81.41



SECTION

TYPICAL FROM STA. 40+00 TO STA. 40+17
TYPICAL FROM STA. 42+21.43 TO STA. 42+51



SECTION

NOTES

Elevations refer to Mean Sea Level Datum.
For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

DIKE-SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

WALLS

CONCRETE DETAILS NO. 5

CONNECTICUT RIVER CHICOPEE, MASS.

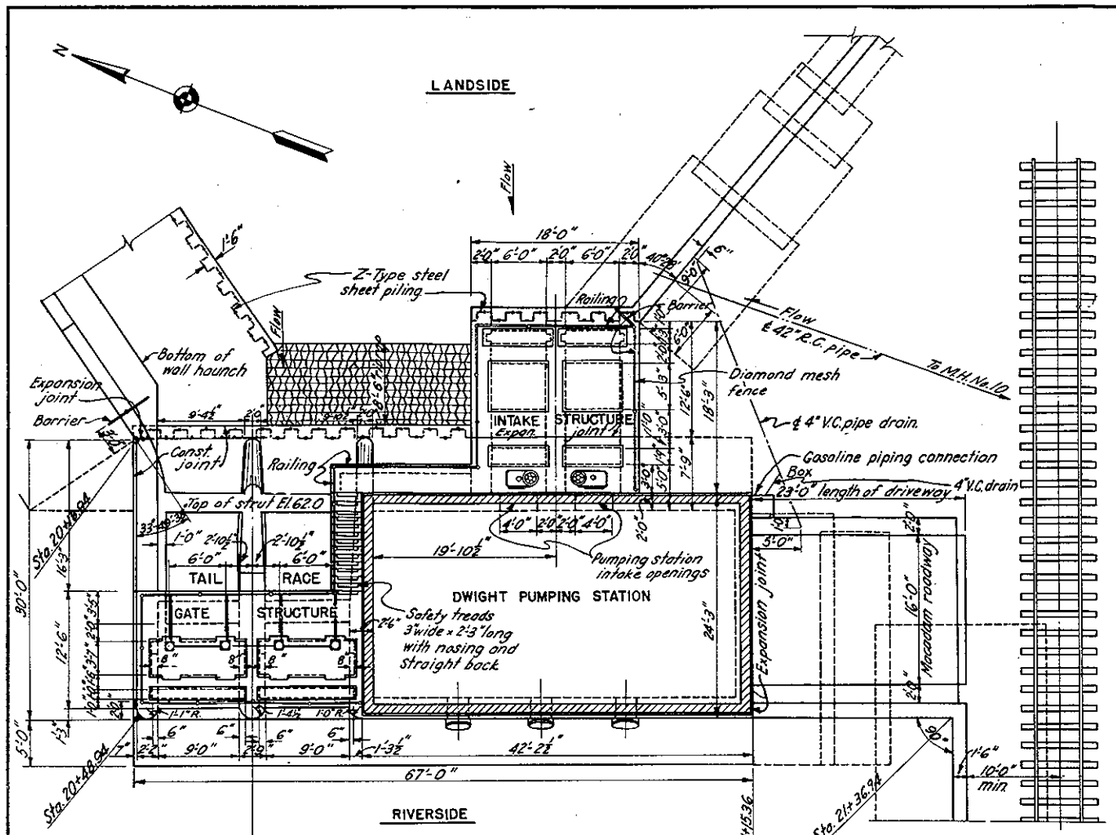
SCALE: 1/4 IN = 1 FT.

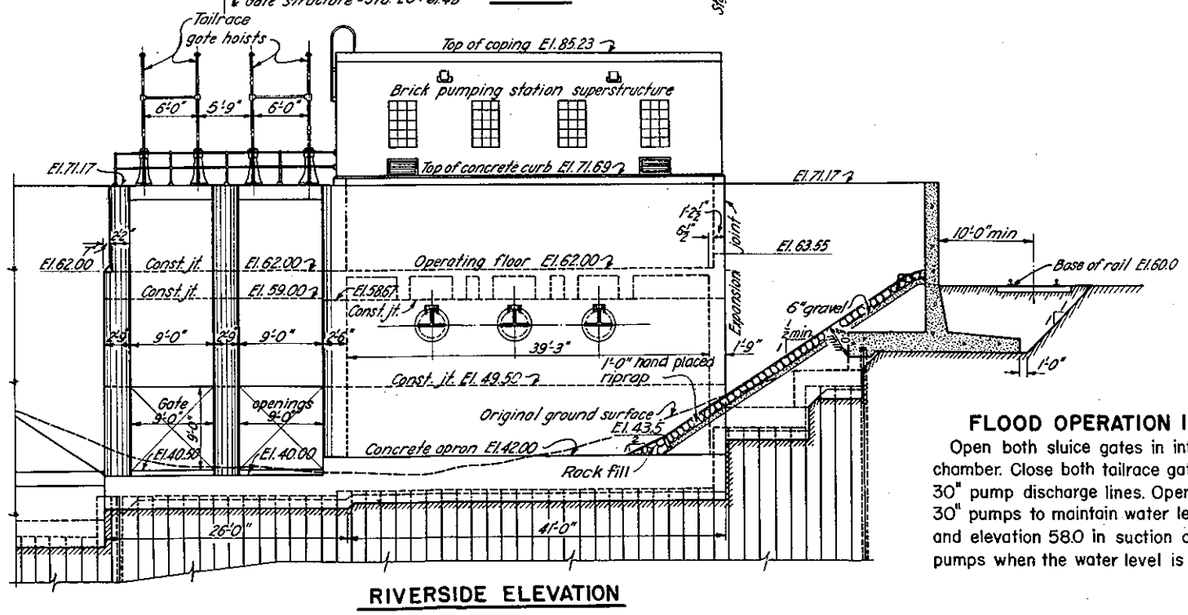
U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

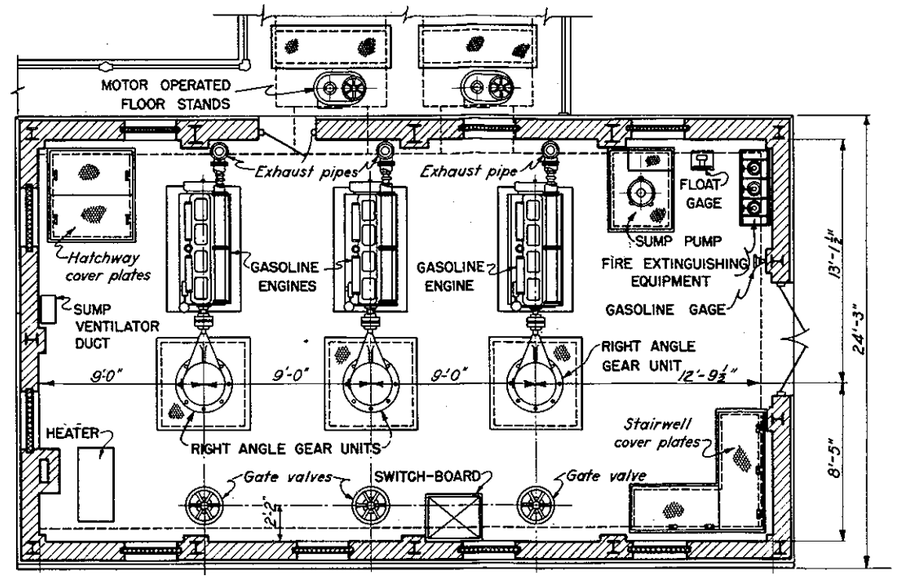
OPERATION AND MAINTENANCE MANUAL

CHICOPEE MASS

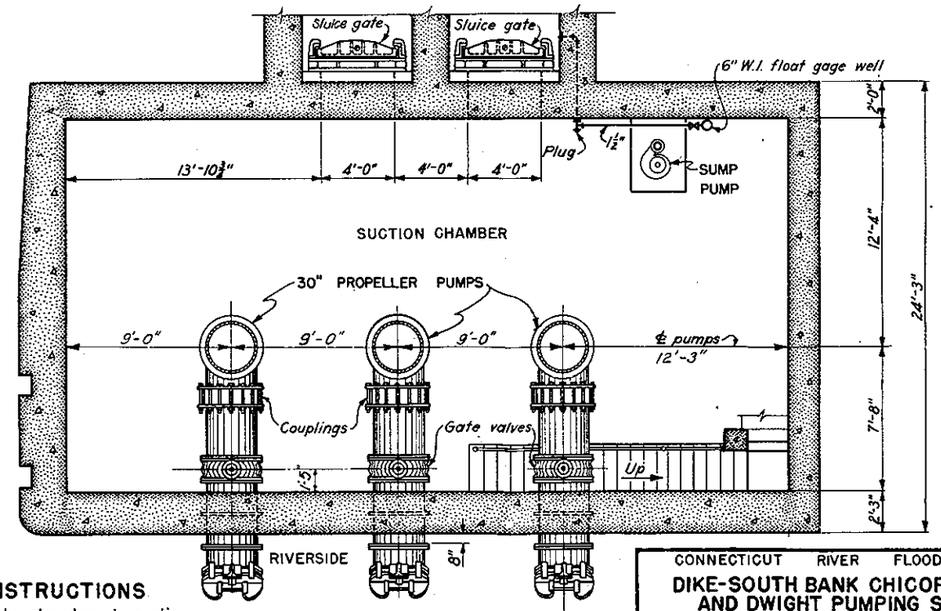
PLATE XXXII







ENGINE ROOM PLAN



PUMP ROOM PLAN

FLOOD OPERATION INSTRUCTIONS

Open both sluice gates in intake structure to suction chamber. Close both tailrace gates. Open gate valves on 30" pump discharge lines. Operate one or more of the 30" pumps to maintain water level between elevation 47.0 and elevation 58.0 in suction chamber. Do not operate pumps when the water level is below elevation 47.0.

CONNECTICUT RIVER FLOOD CONTROL

DIKE-SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

GENERAL ARRANGEMENT

PUMPING STATION

CONNECTICUT RIVER CHICOPEE, MASS.

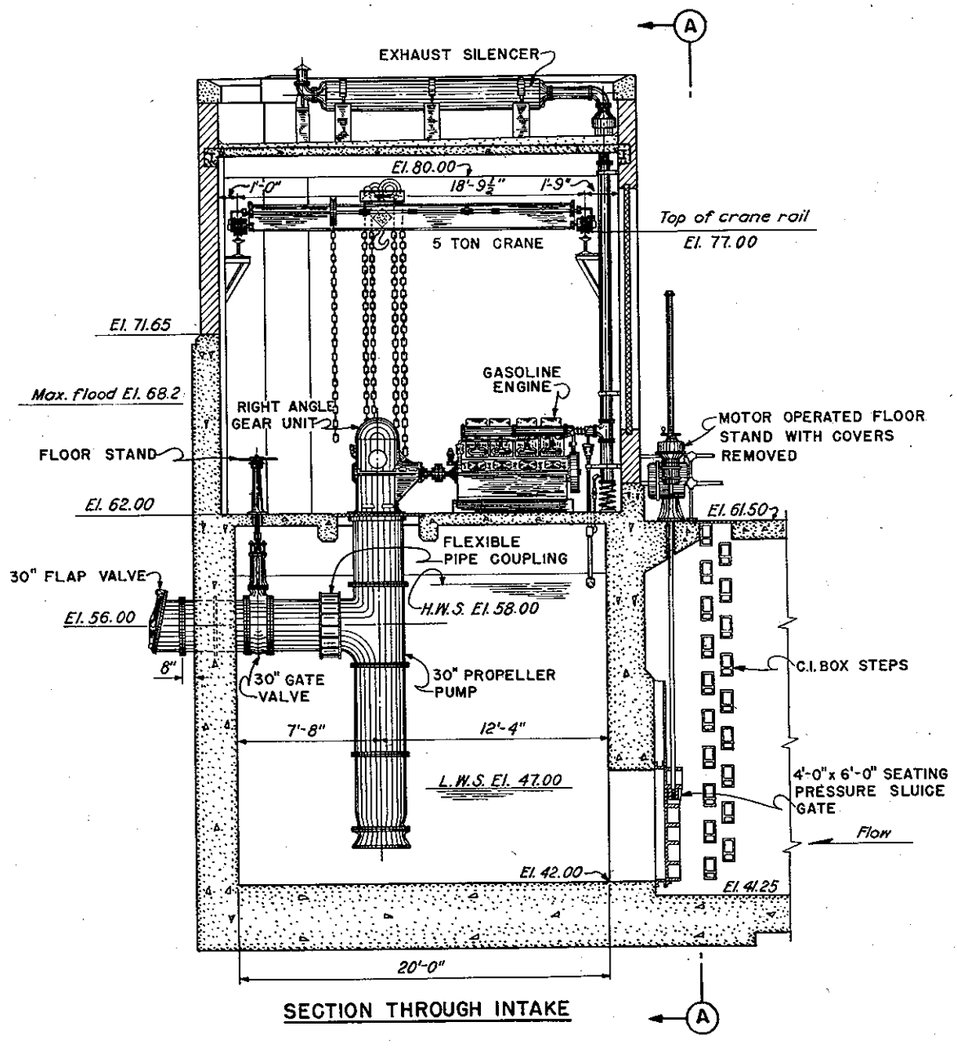
SCALE: 1/8 IN. = 1 FT.

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,

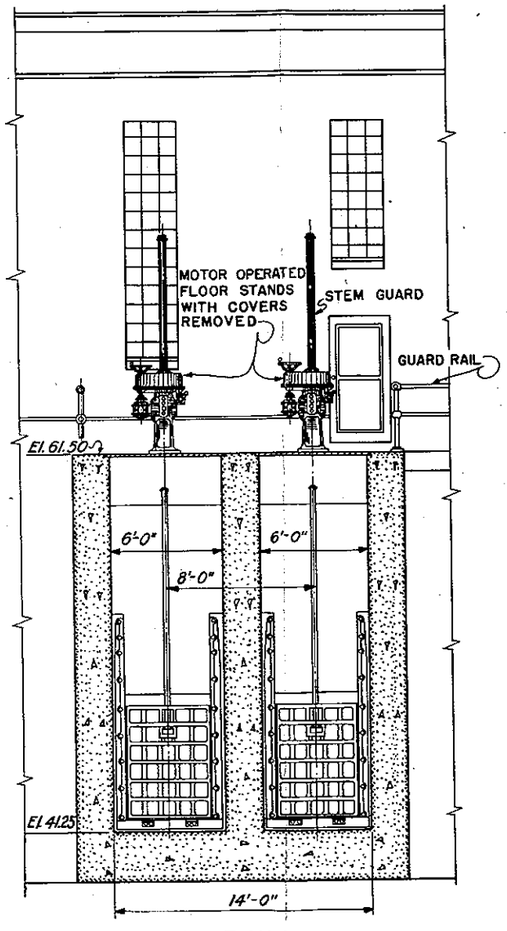
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS.

PLATE XXXIII



SECTION THROUGH INTAKE



SECTION A

CONNECTICUT RIVER FLOOD CONTROL

DIKE-SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

SECTIONS SHOWING GENERAL ARRANGEMENT OF EQUIPMENT

CONNECTICUT RIVER — CHICOPEE, MASS.

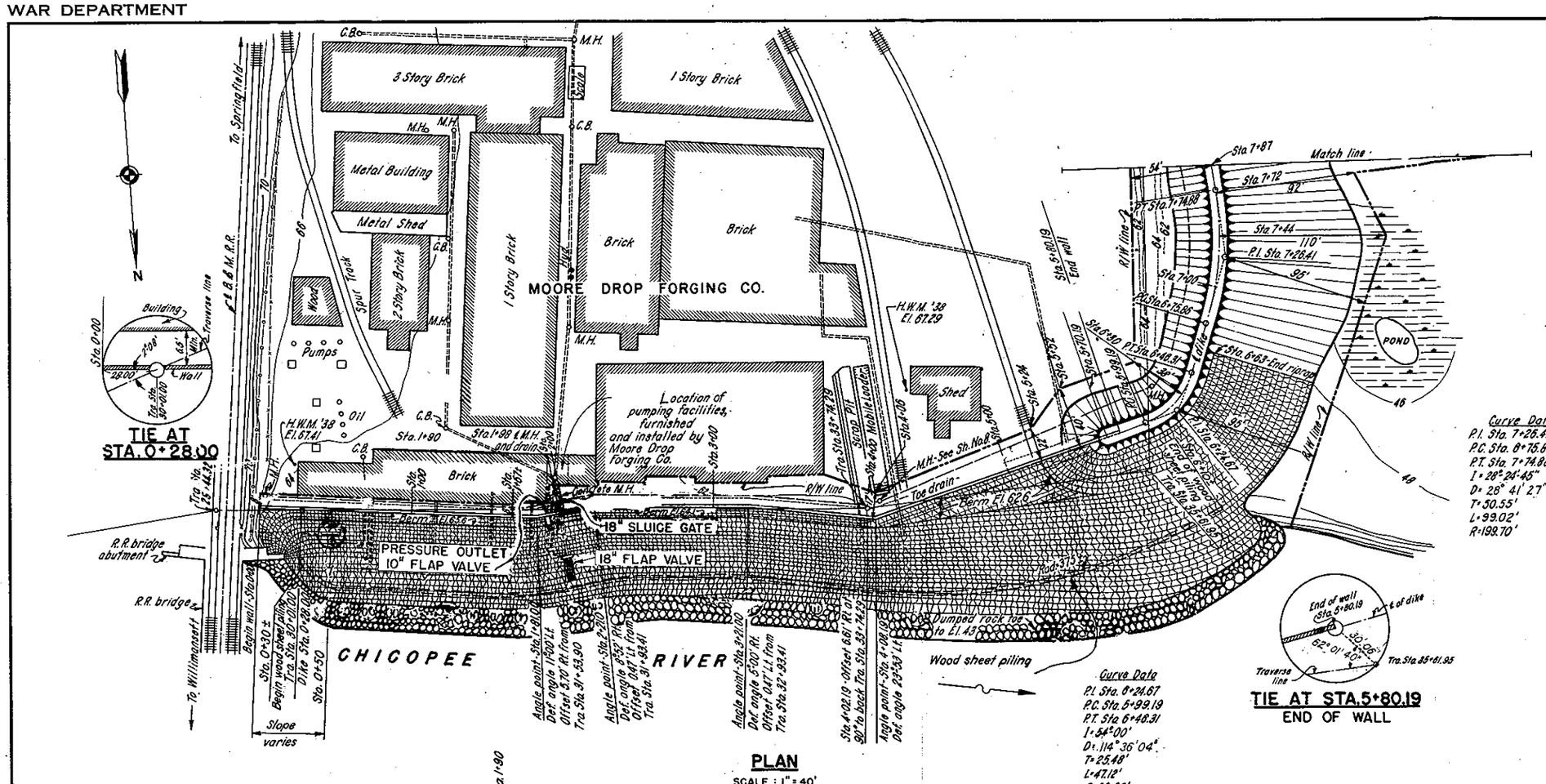
SCALE: 1/4 IN. = 1 FT.

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

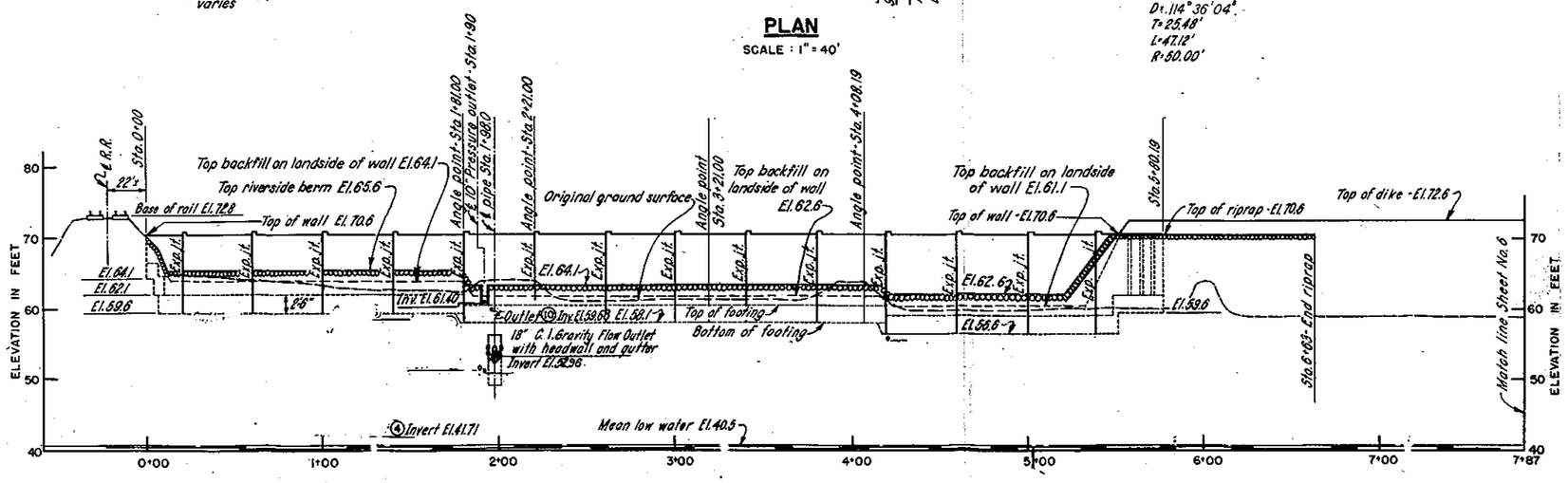
CHICOPEE, MASS

PLATE XXXIV



PLAN

SCALE : 1" = 40'



PROFILE ALONG ℄ DIKE

SCALES : HOR. 1" = 40'
VERT. 1" = 10'

NOTES

All elevations refer to Mean Sea Level Datum.
Riverside face of flood wall is on ℄ dike.
For further details, see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

CHICOPEE DIKE

FISCAL YEAR 1940 UNIT

PLAN AND PROFILE NO. 1

CONNECTICUT & CHICOPEE RIVERS MASSACHUSETTS

SCALE : 1 IN. = 40 FT.

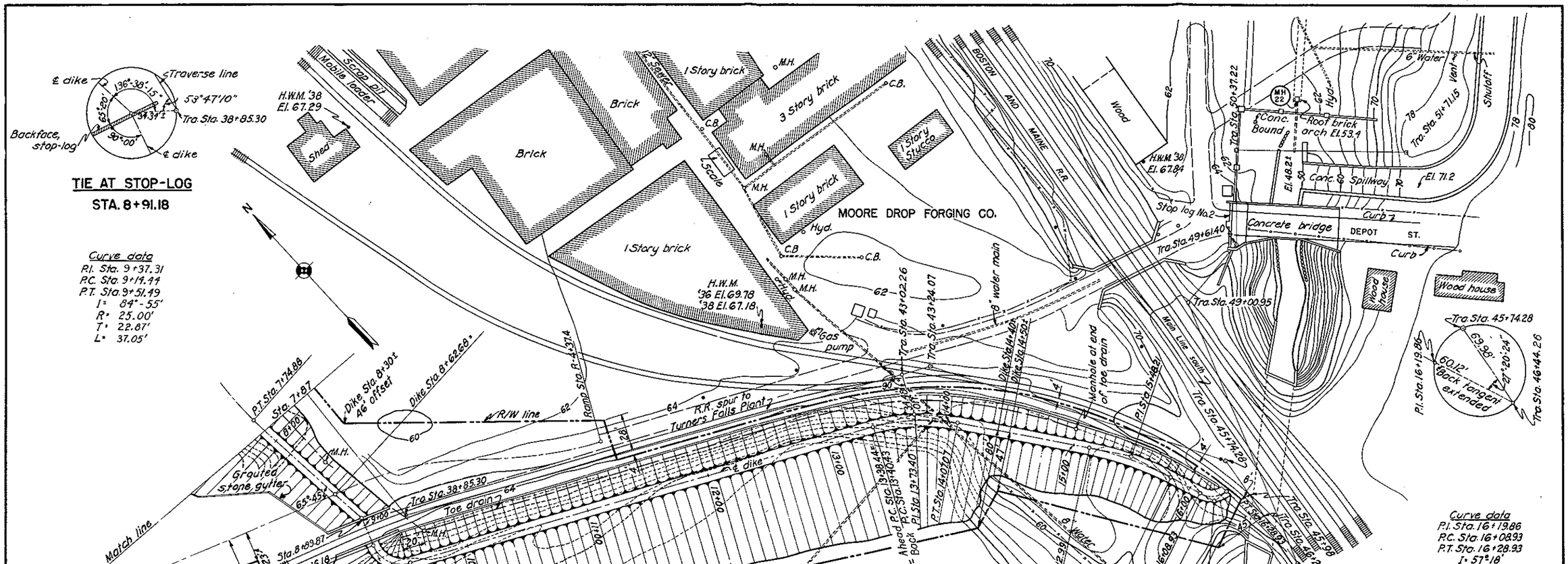
U. S. ENGINEER OFFICE, PROVIDENCE, R. I.

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

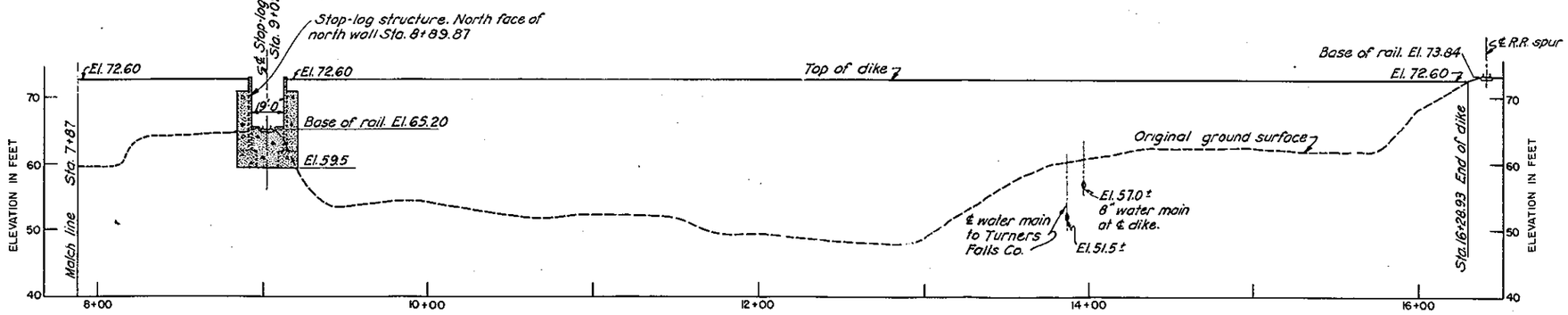
PLATE XXXV

(9)



PLAN

SCALE : 1" = 40'



PROFILE ALONG ℄ DIKE

SCALE: HOR. 1" = 40'
VERT. 1" = 10'

NOTES

Elevations refer to Mean Sea Level Datum
For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

CHICOPEE DIKE

FISCAL YEAR 1940 UNIT

PLAN AND PROFILE NO. 2

CONNECTICUT & CHICOPEE RIVERS MASSACHUSETTS

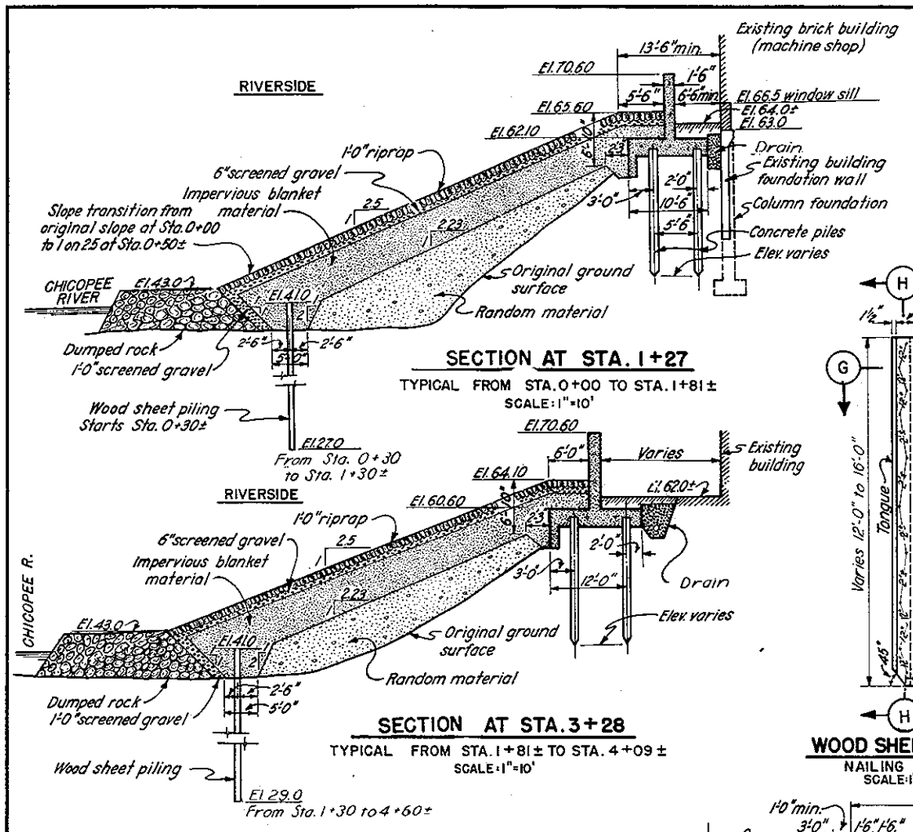
SCALE: 1 IN. = 40 FT

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS.

PLATE XXXVI



SECTION AT STA. 1+27

TYPICAL FROM STA. 0+00 TO STA. 1+81±

SCALE: 1"=10'

SECTION AT STA. 3+28

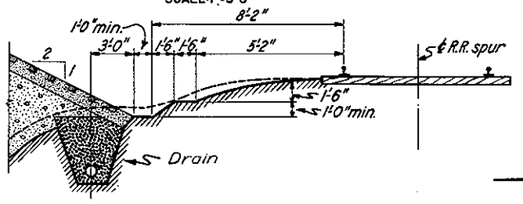
TYPICAL FROM STA. 1+81± TO STA. 4+09±

SCALE: 1"=10'

WOOD SHEET PILING

NAILING PLAN

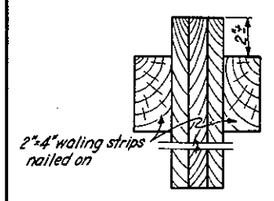
SCALE: 1"=3'-0"



GUTTER SECTION

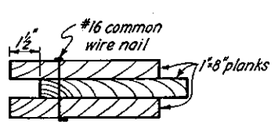
TYPICAL FROM STA. 9+50± TO STA. 16+28.93

SCALE: 1"=5'-0"



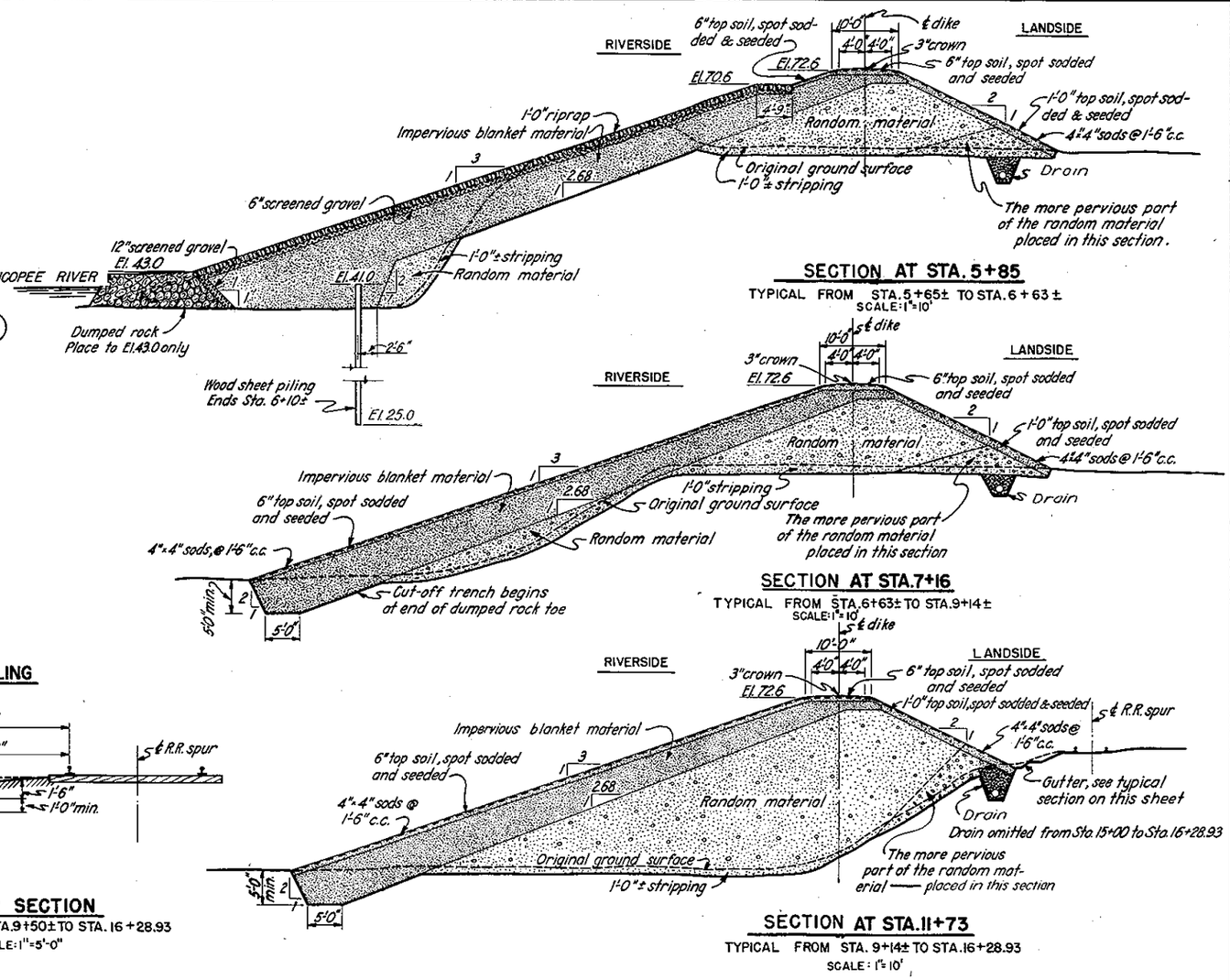
SECTION H

SCALE: 3"=1'-0"



SECTION G

SCALE: 3"=1'-0"



SECTION AT STA. 5+85

TYPICAL FROM STA. 5+65± TO STA. 6+63±

SCALE: 1"=10'

SECTION AT STA. 7+16

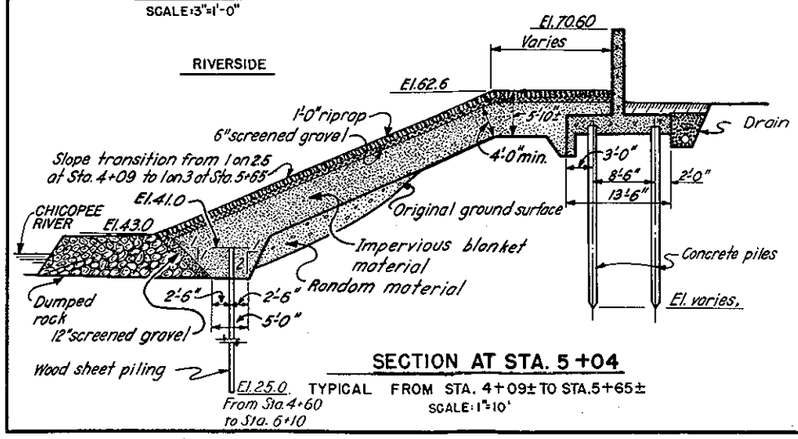
TYPICAL FROM STA. 6+63± TO STA. 9+14±

SCALE: 1"=10'

SECTION AT STA. 11+73

TYPICAL FROM STA. 9+14± TO STA. 16+28.93

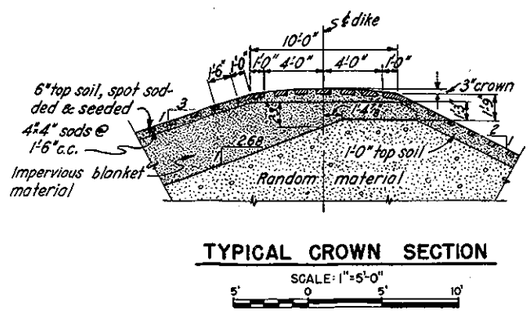
SCALE: 1"=10'



SECTION AT STA. 5+04

TYPICAL FROM STA. 4+09± TO STA. 5+65±

SCALE: 1"=10'



TYPICAL CROWN SECTION

SCALE: 1"=5'-0"

NOTES

Elevations refer to Mean Sea Level datum.
For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

CHICOPEE DIKE

FISCAL YEAR 1940 UNIT

DIKE AND RIVER-BANK TREATMENT

SECTIONS

CONNECTICUT & CHICOPEE RIVERS MASSACHUSETTS

SCALE: 1 IN. = 10 FT.

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE XXXVII

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY

PROPERTY OF SPRINGFIELD RENDERING COMPANY

CITY OF CHICOPEE, MASSACHUSETTS

GARAGE

FIRE HYDRANT

MAIN BUILDING

STORAGE BUILDING

LOADING PLATFORM

SPUR TRACK

SPRINGFIELD RENDERING CO.

LOADING PLATFORM

Manhole No. 2 with gate valve

REINFORCED WALL

REINFORCED WALL

COAL BIN

Manhole No. 1

12" REINFORCED EXTENSION

STORAGE SHED

DRIVEWAY

Catch basin with gate valve

GATE

CATTLE SHEDS

CONCRETE RETAINING WALL

PROPOSED CURTAIN WALL

TOP OF BANK

18" REINFORCED EXTENSION

ALL OF RIVER BANK WITHIN THESE LIMITS AND BETWEEN MEAN LOW WATER AND TOP OF BANK PAVED WITH RIPRAP STONE

APPROXIMATE MEAN LOW WATER

RIPRAP

CONNECTICUT RIVER

Borings shown thus: ●

REINFORCED WALL (Approx. 142 Lin. Ft.)

12" REINFORCED EXTENSION Approx. 47 Lin. Ft.

12" REINFORCED EXTENSION Approx. 70 Lin. Ft.

REINFORCED WALL Approx. 93 Lin. Ft.

18 REINFORCED EXTENSION Approx. 107 Lin. Ft.

REINF. WALL Approx. 35 Lin. Ft.

TOP OF EXISTING FOUNDATIONS

BOTTOM OF EXISTING FOUNDATIONS

BOTTOM OF EXISTING GRAVITY WALL

ELEV. BOTTOM OF FOOTING

EXISTING GROUND LINE

WATER LINE 10-28-36

88+88

87+38

85+88

85+35

84+25

84+16

RIVERSIDE LANDSIDE

RIPRAP PAVING

EARTH FILL

EXISTING FOUNDATION

EXISTING WALL

To be graded

NOTES

When river reaches El. 65.0 close gate valve at Manhole No. 2 and catch basin. Use portable pumps to discharge water over flood wall.

Elevations refer to Mean Sea Level datum.

CONNECTICUT RIVER FLOOD CONTROL

DIKE WORK

(NORTH OF NORTH END BRIDGE)

SPRINGFIELD MASS.

SCALE 1" = 20'

U.S. ENGINEER OFFICE, PROVIDENCE, R. I.

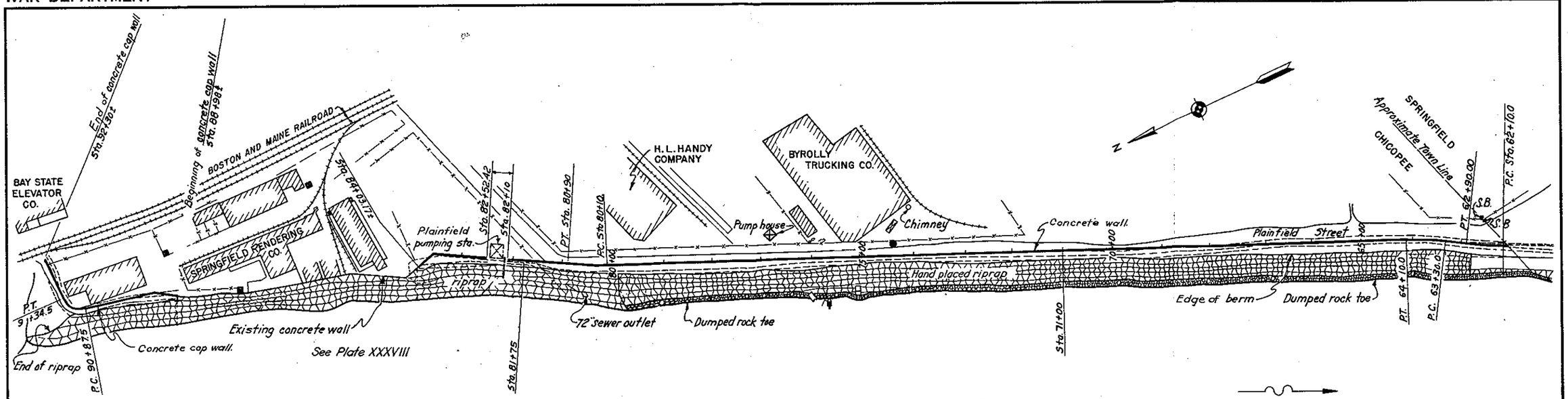
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE XXXVIII

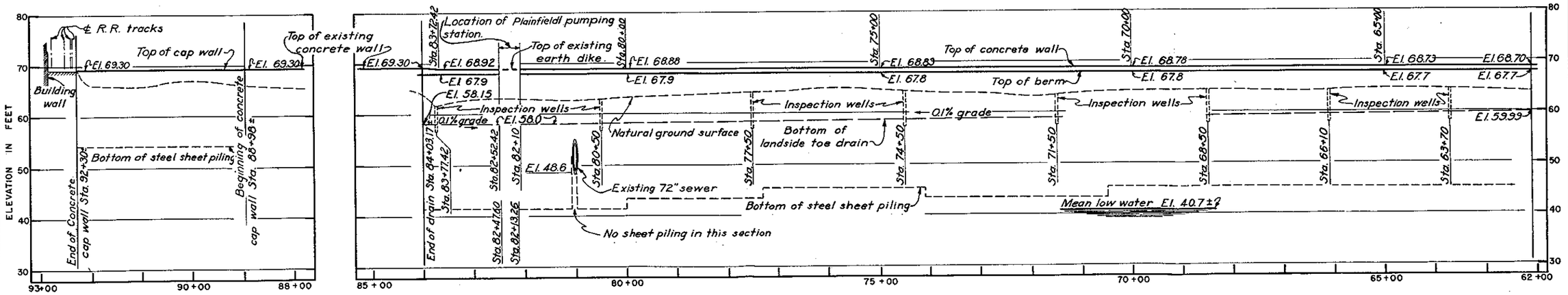
WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY



PLAN

SCALE: 1" = 100'-0"



PROFILE

SCALE: HORIZ. 1" = 100'-0"
VERT. 1" = 10'-0"

LEGEND

- Manholes ○
- Hydrants ◉
- Covered hydrants ▣
- Stone bounds ▪
- Catch basins ▫ ⊓

NOTES

Elevations refer to Mean Sea Level Datum.

CONNECTICUT RIVER FLOOD CONTROL

SPRINGFIELD DIKE

CHICOPEE TOWN LINE TO HIGH GROUND

GENERAL PLAN

CHICOPEE, MASS.

CONNECTICUT RIVER — MASSACHUSETTS

SCALE: 1 IN = 100 FT.

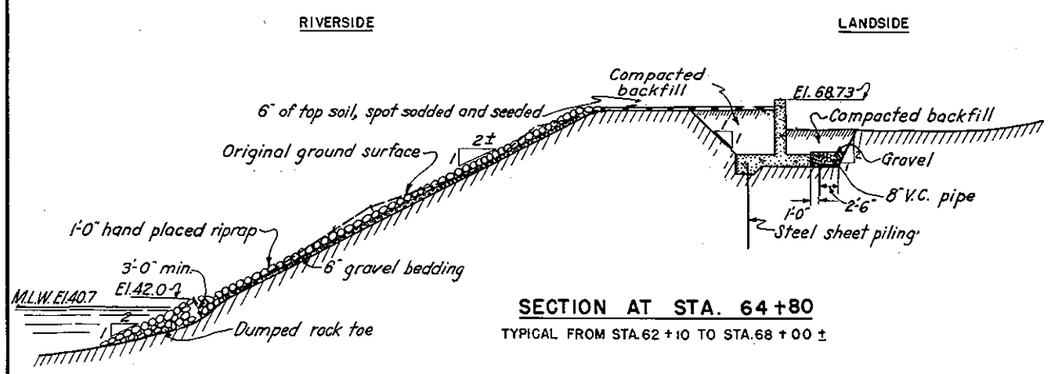
100' 0 100' 200'

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,

OPERATION AND MAINTENANCE MANUAL

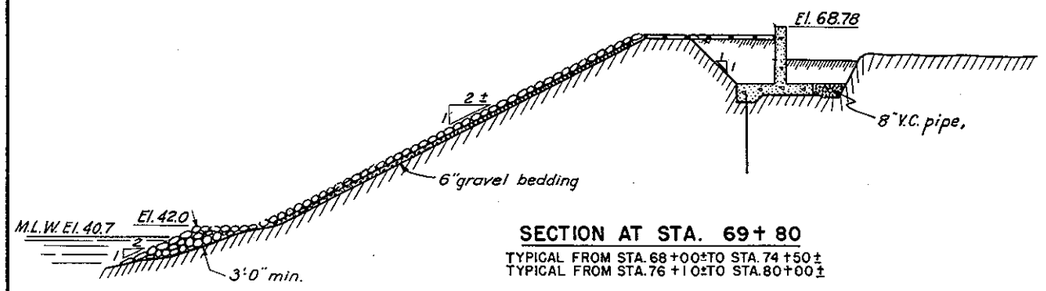
CHICOPEE, MASS

PLATE XXXIX



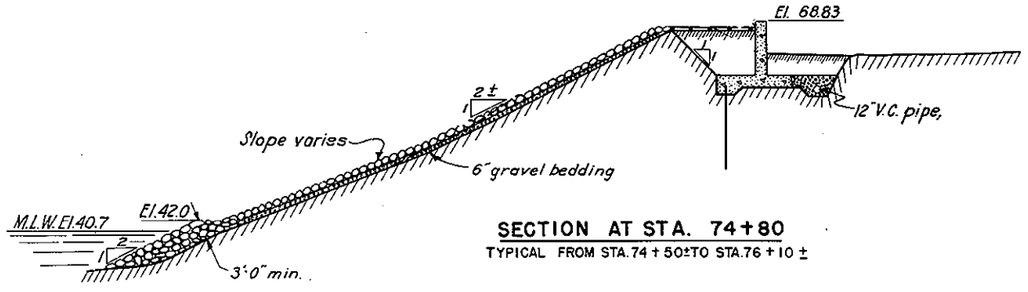
SECTION AT STA. 64+80

TYPICAL FROM STA. 62+10 TO STA. 68+00 ±



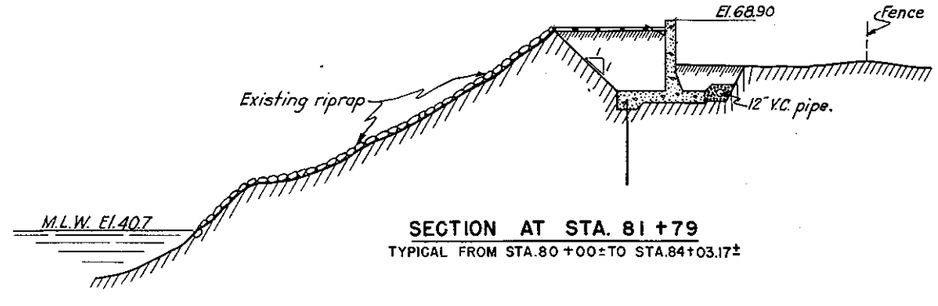
SECTION AT STA. 69+80

TYPICAL FROM STA. 68+00±TO STA. 74+50±
TYPICAL FROM STA. 76+10±TO STA. 80+00±



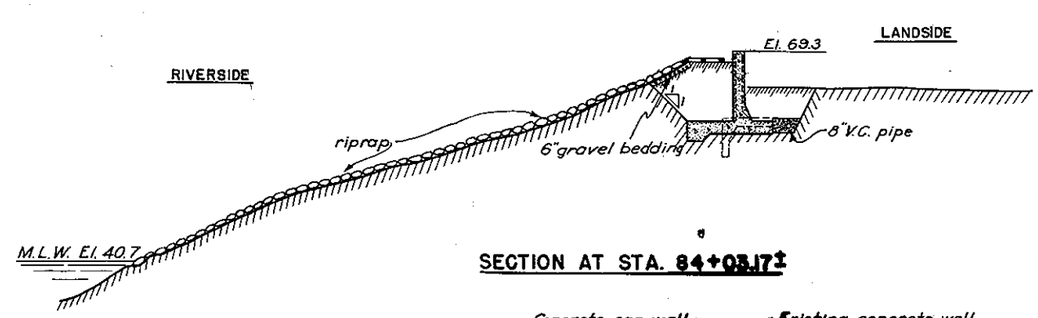
SECTION AT STA. 74+80

TYPICAL FROM STA. 74+50±TO STA. 76+10 ±

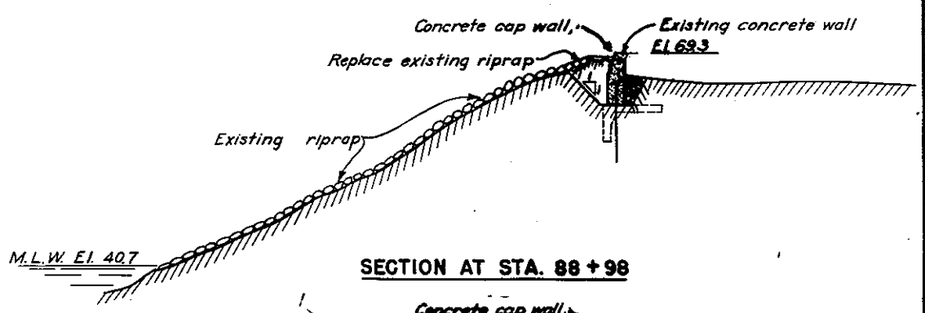


SECTION AT STA. 81+79

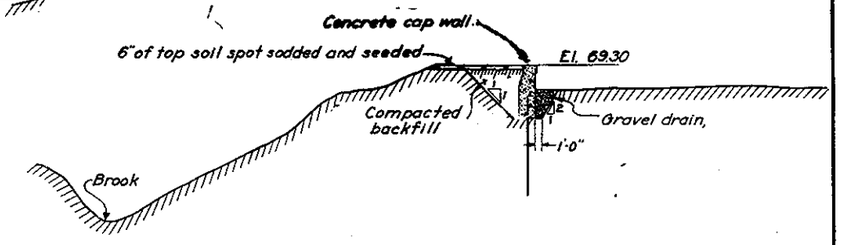
TYPICAL FROM STA. 80+00±TO STA. 84+03.17±



SECTION AT STA. 84+03.17±

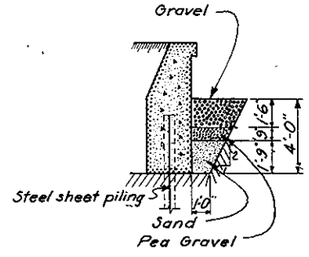


SECTION AT STA. 88+98



SECTION AT STA. 91+90

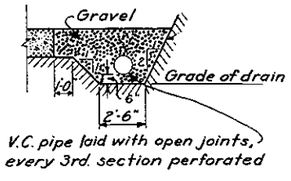
TYPICAL FROM STA. 88+98 TO STA. 92+30



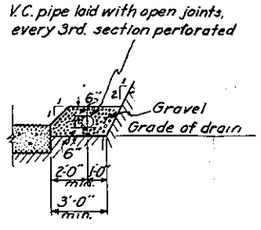
TYPICAL FROM STA. 88+98 TO 92+30

NOTES

Elevations refer to Mean Sea Level Datum.
For further details see contract drawings furnished city.



TYPICAL FROM STA. 64+50± TO 70+50±
TYPICAL FROM STA. 74+50± TO 80+10±



TYPICAL FROM STA. 62+10 ± TO 64+50 ±
TYPICAL FROM STA. 70+50± TO 74+50 ±
TYPICAL FROM STA. 80+10± TO 82+10 ±
TYPICAL FROM STA. 82+50± TO 84+03.17 ±

DETAILS OF DRAIN

SCALE 1/4" = 1'

CONNECTICUT RIVER FLOOD CONTROL

SPRINGFIELD DIKE

CHICOPEE TOWN LINE TO HIGH GROUND

TYPICAL SECTIONS

CHICOPEE, MASS.

CONNECTICUT RIVER — MASSACHUSETTS

SCALE: 1 IN. = 10 FT.

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,

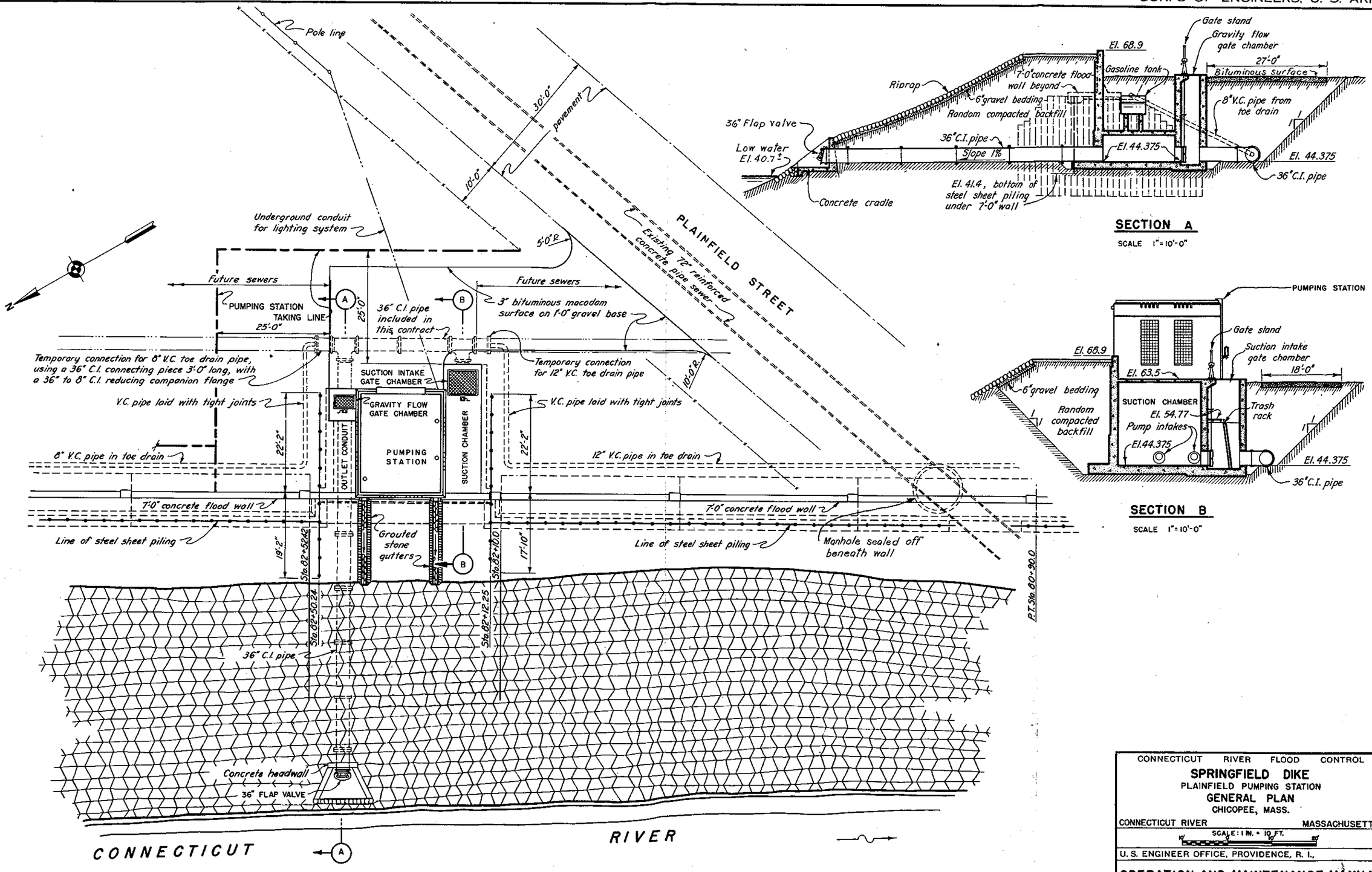
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE XL

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY



PLAN

SCALE 1" = 10'-0"

SECTION A

SCALE 1" = 10'-0"

SECTION B

SCALE 1" = 10'-0"

CONNECTICUT RIVER FLOOD CONTROL

SPRINGFIELD DIKE

PLAINFIELD PUMPING STATION

GENERAL PLAN

CHICOPEE, MASS.

CONNECTICUT RIVER MASSACHUSETTS

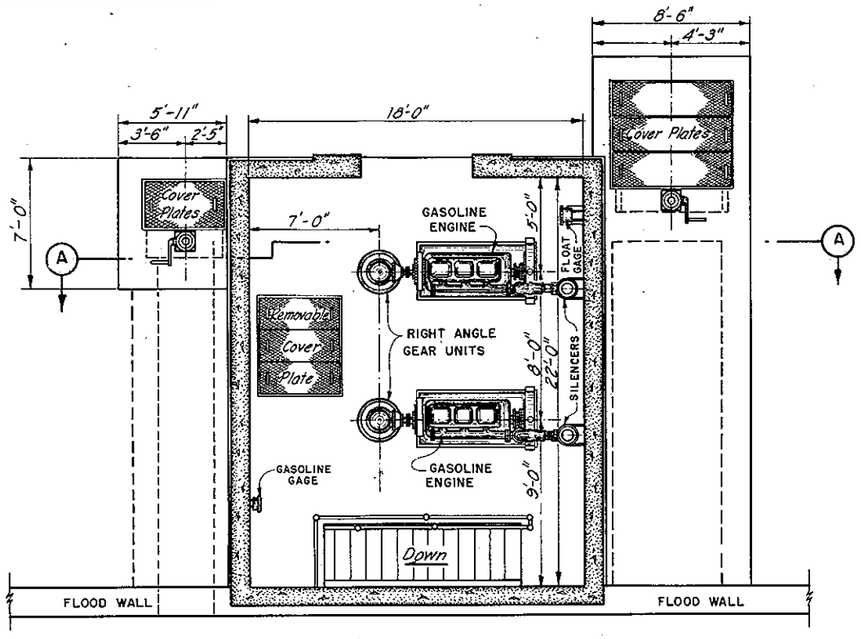
SCALE: 1 IN. = 10 FT.

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,

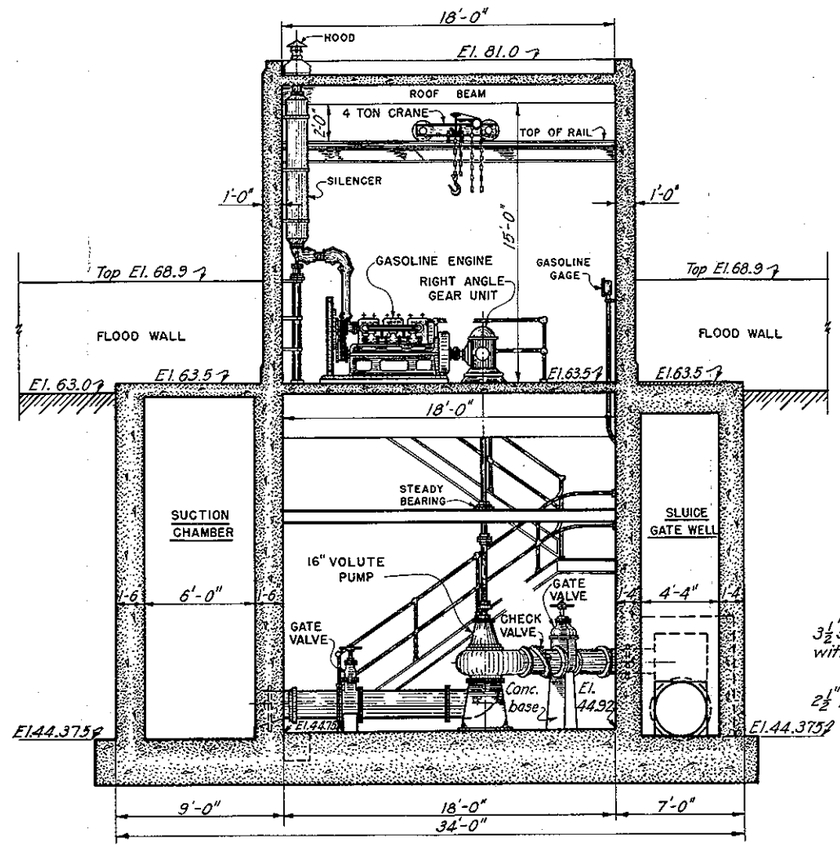
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS.

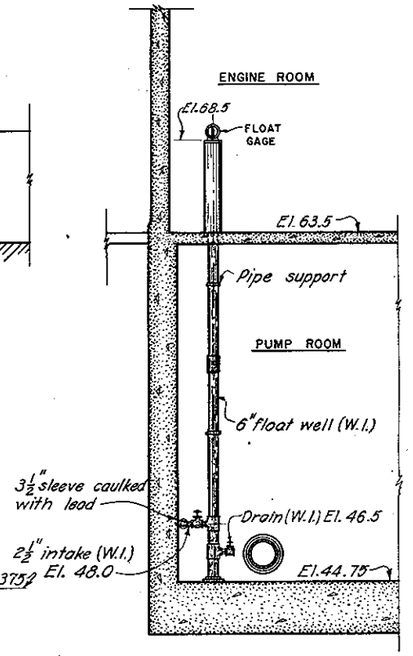
PLATE XLI



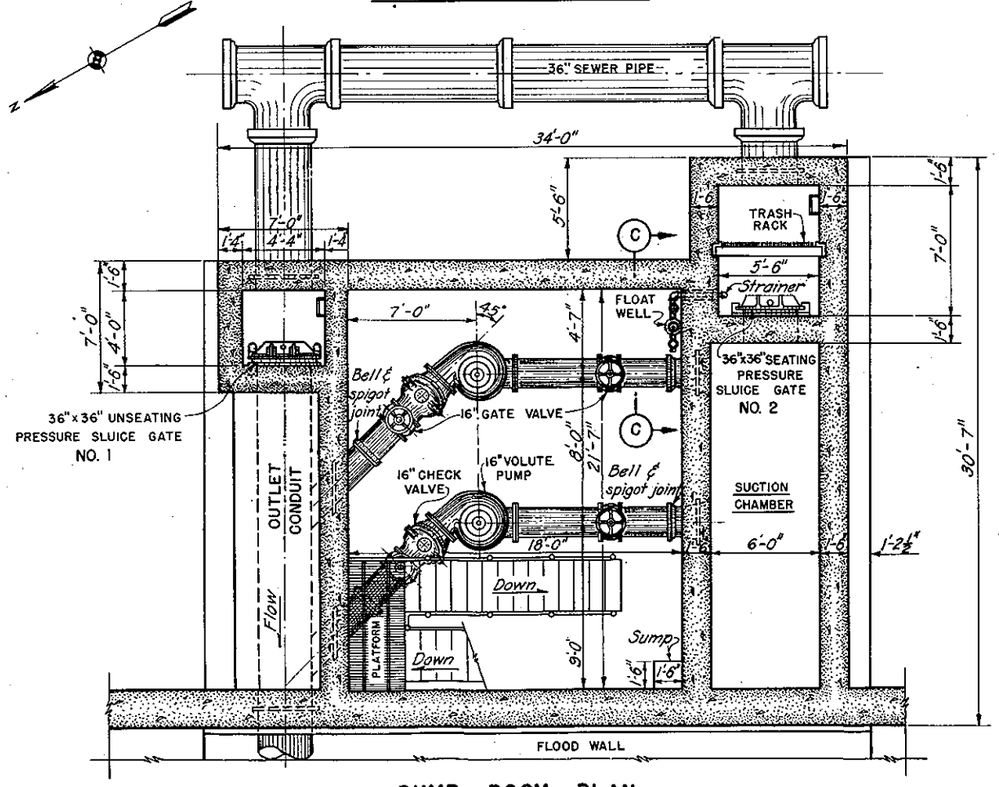
ENGINE ROOM PLAN



SECTION A



SECTION C



PUMP ROOM PLAN

FLOOD OPERATION INSTRUCTIONS

Close sluice gate No. 1 on outlet conduit. Open sluice gate No. 2 on suction chamber. Open gate valves on 16" volute pump lines. Operate one or both volute pumps to maintain water level between elevation 48.5 and elevation 54.0 in intake structure. Do not operate pumps when water level is below elevation 48.5.

NOTES

Elevations refer to mean sea level datum.
For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

SPRINGFIELD DIKE

PLAINFIELD PUMPING STATION

MECHANICAL EQUIPMENT

CHICOPEE, MASS.

CONNECTICUT RIVER — MASSACHUSETTS

SCALE: 1/4 IN = 1 FT.

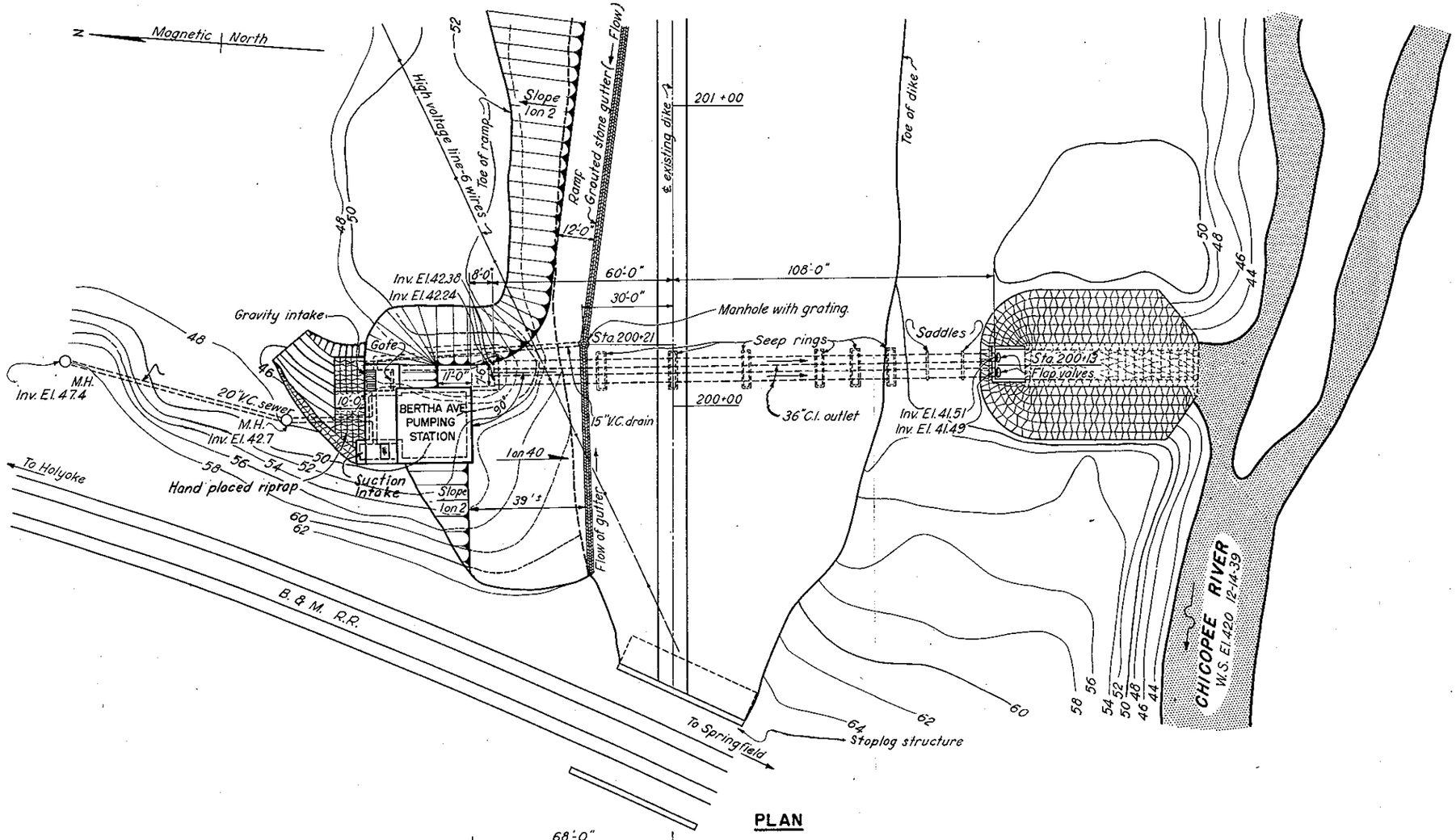
0 5' 10'

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,

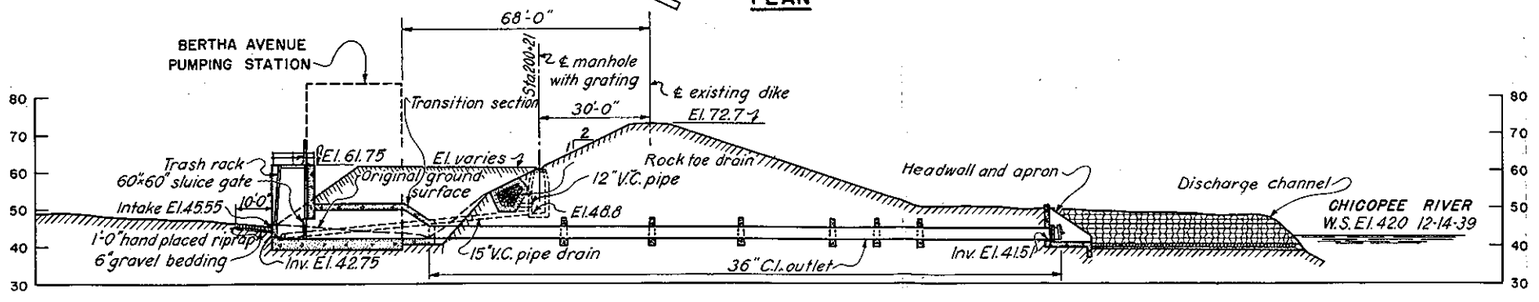
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE XLII



PLAN



PROFILE ALONG ℄ CONDUIT

NOTE

Elevations refer to Mean Sea Level Datum.

For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

BERTHA AVENUE PUMPING STATION

CHICOPEE, MASS.

GENERAL PLAN

CONNECTICUT RIVER — MASSACHUSETTS

SCALE: 1 IN. = 20 FT.

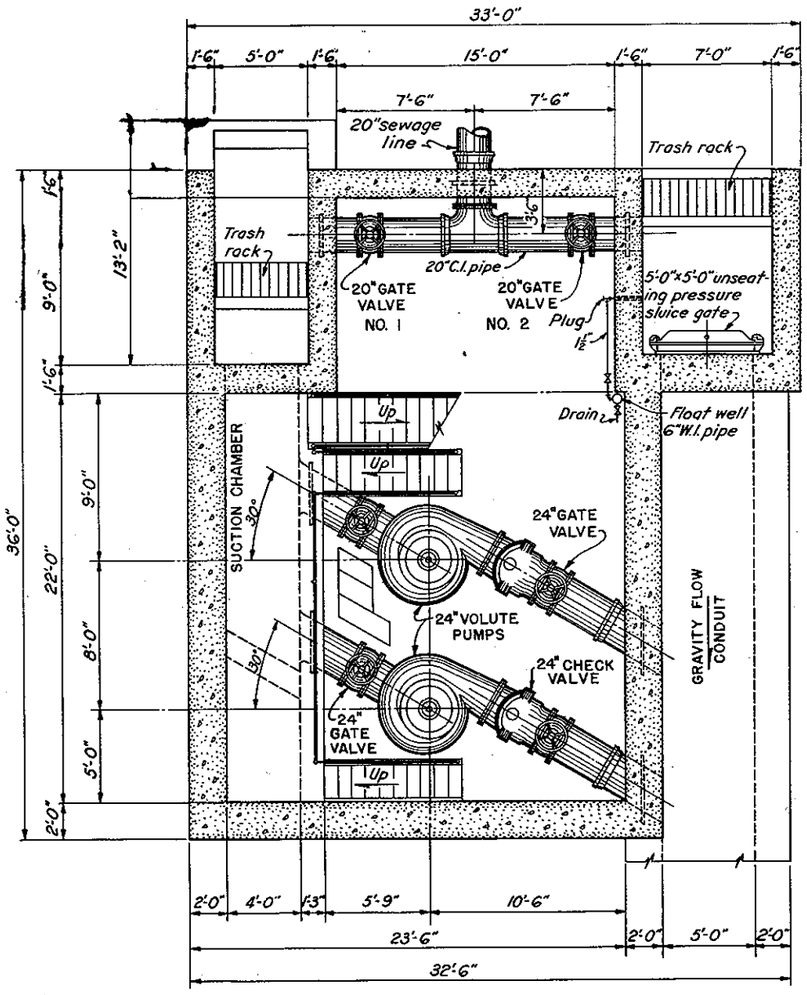
20' 0 20' 40'

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

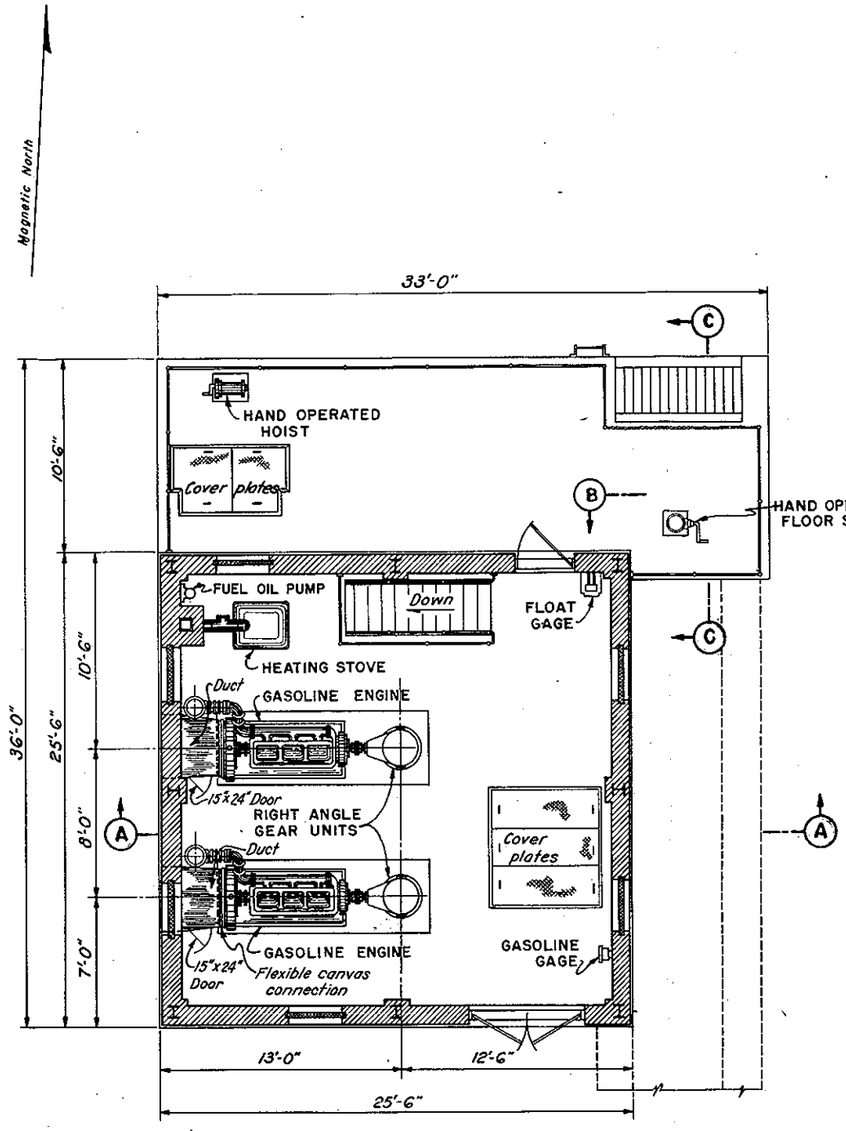
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE XLIII



PUMP ROOM PLAN



ENGINE ROOM PLAN

FLOOD OPERATION INSTRUCTIONS

Open 20" gate valve No. 1 to suction inlet, close 20" gate valve No. 2 to gravity inlet. Close sluice gate in gravity flow conduit. Open 24" gate valves on 24" volute pumps. Operate one or both volute pumps to maintain water level between elevation 48.0 and elevation 56.0 in intake structure.

CONNECTICUT RIVER FLOOD CONTROL

BERTHA AVENUE PUMPING STATION

CHICOPEE, MASS.

GENERAL ARRANGEMENT OF EQUIPMENT

CONNECTICUT RIVER — MASSACHUSETTS

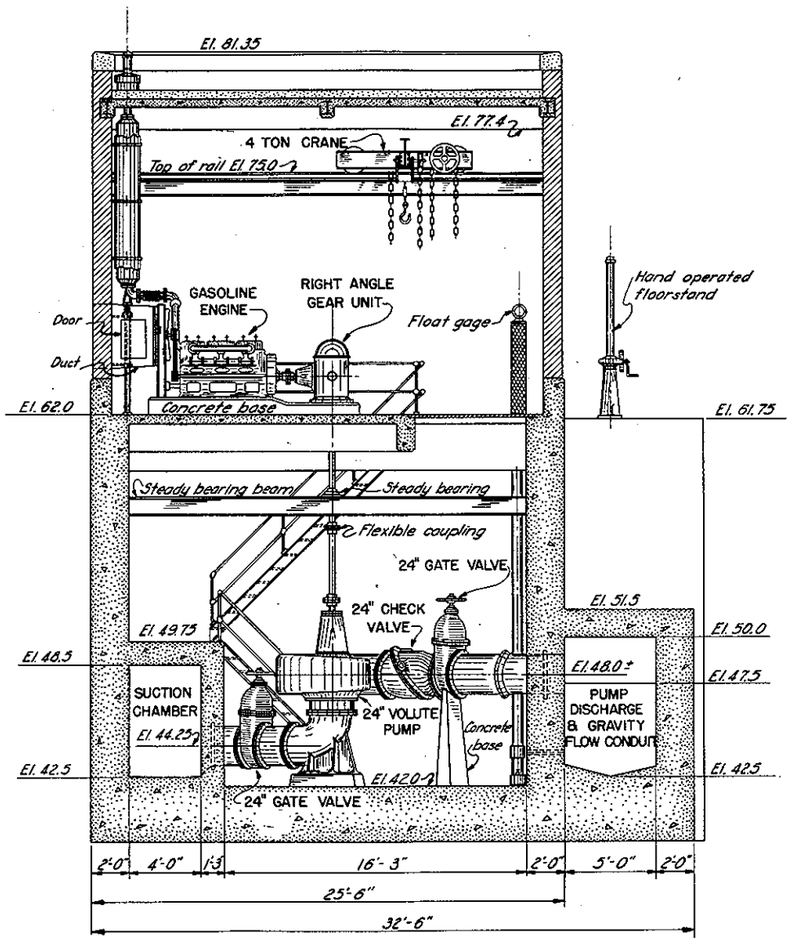
SCALE: 1/4 IN. = 1 FT.

5' 0 5' 10'

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

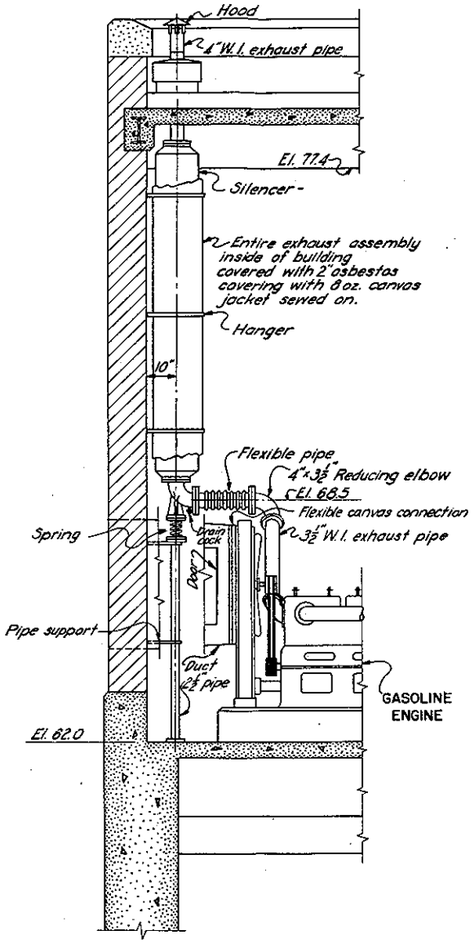
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS



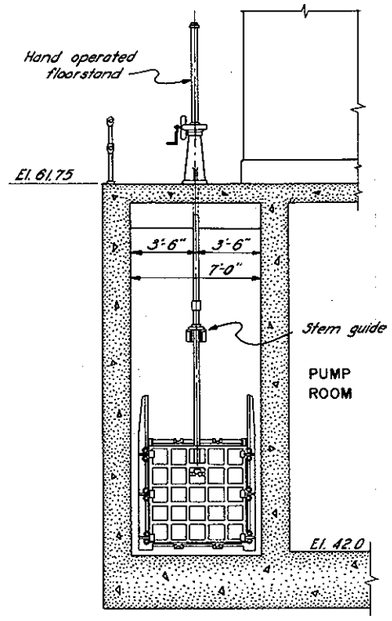
SECTION A

SCALE: $\frac{1}{4}$" = 1'-0"



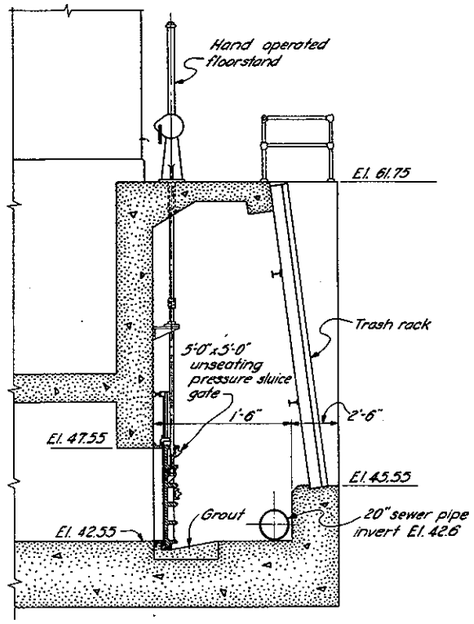
DETAIL OF GASOLINE ENGINE EXHAUST

SCALE: $\frac{1}{2}$" = 1'-0"



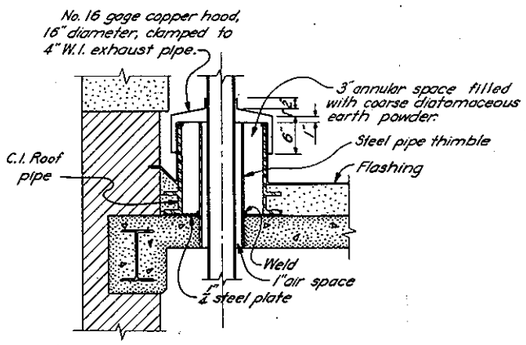
SECTION B

SCALE: $\frac{1}{4}$" = 1'-0"



SECTION C

SCALE: $\frac{1}{4}$" = 1'-0"



DETAIL OF ENGINE EXHAUST AT ROOF

SCALE: 1" = 1'-0"

NOTE

Elevations refer to Mean Sea Level datum. For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

BERTHA AVENUE PUMPING STATION

CHICOPEE, MASS.

MISCELLANEOUS DETAILS

CONNECTICUT RIVER — MASSACHUSETTS

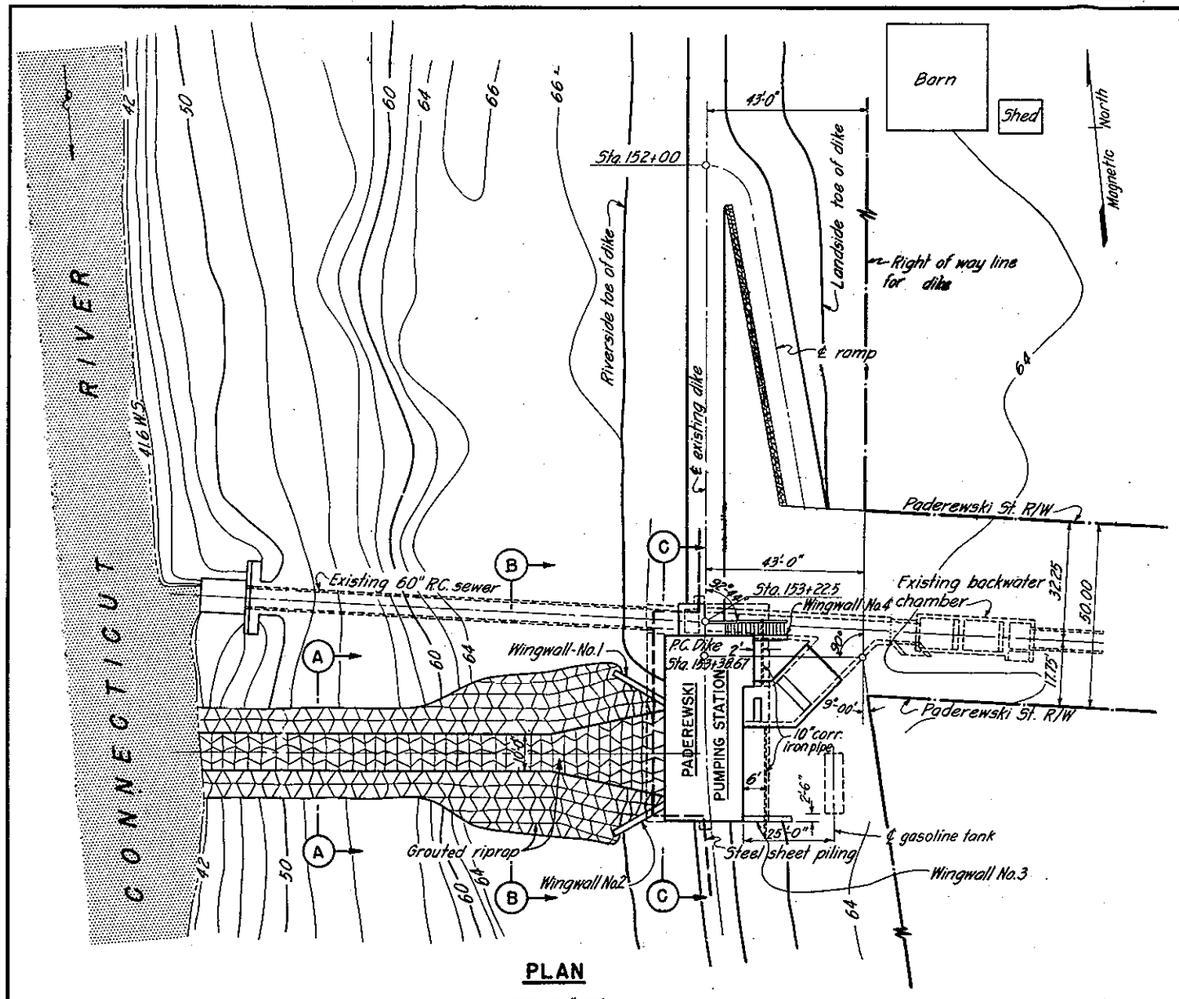
SCALE: 1/4 IN. = 1 FT.

U. S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

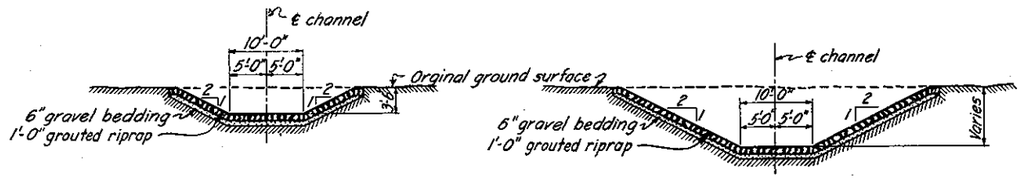
CHICOPEE, MASS

PLATE XLV



PLAN

SCALE: 1"=20'

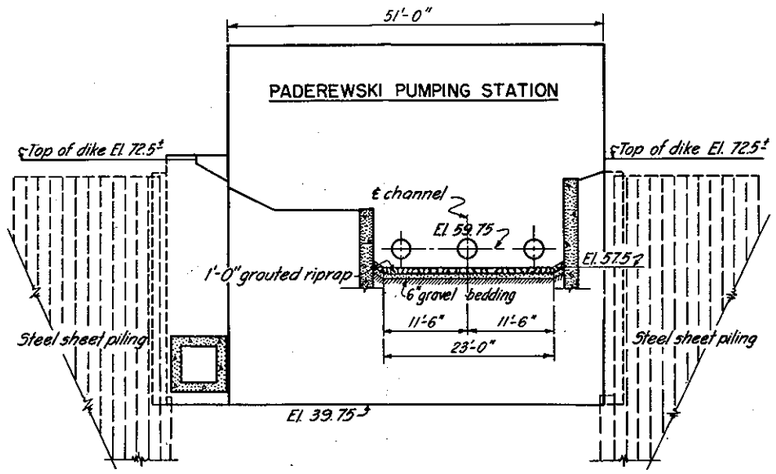


SECTION A

SCALE: 1"=10'

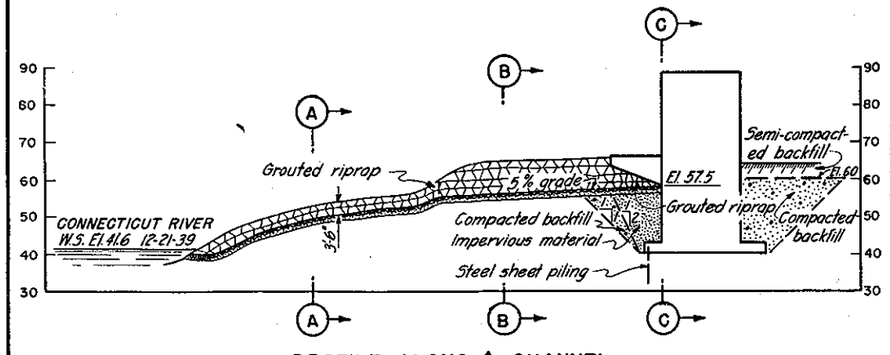
SECTION B

SCALE: 1"=10'



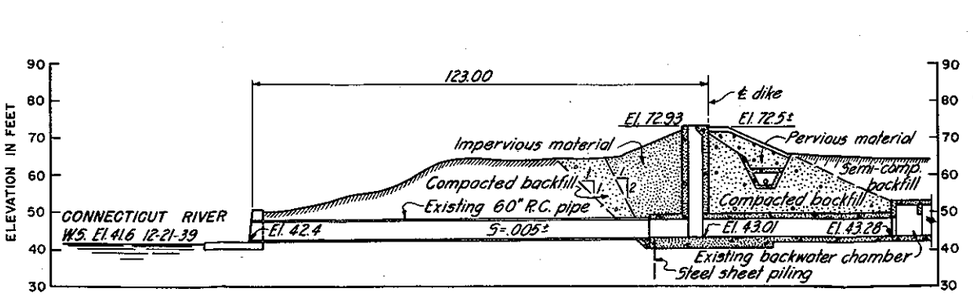
SECTION C

SCALE: 1"=10'



PROFILE ALONG ℄ CHANNEL

SCALE: 1" = 20'



PROFILE ALONG ℄ EXISTING PIPE

SCALE: 1"=20'

NOTE

Elevations refer to Mean Sea Level Datum.
For further details see contract drawings furnished city

CONNECTICUT RIVER FLOOD CONTROL

PADEREWSKI PUMPING STATION

CHICOPEE, MASS.

GENERAL PLAN

CONNECTICUT RIVER — MASSACHUSETTS

SCALE: 1 IN. = 20 FT.

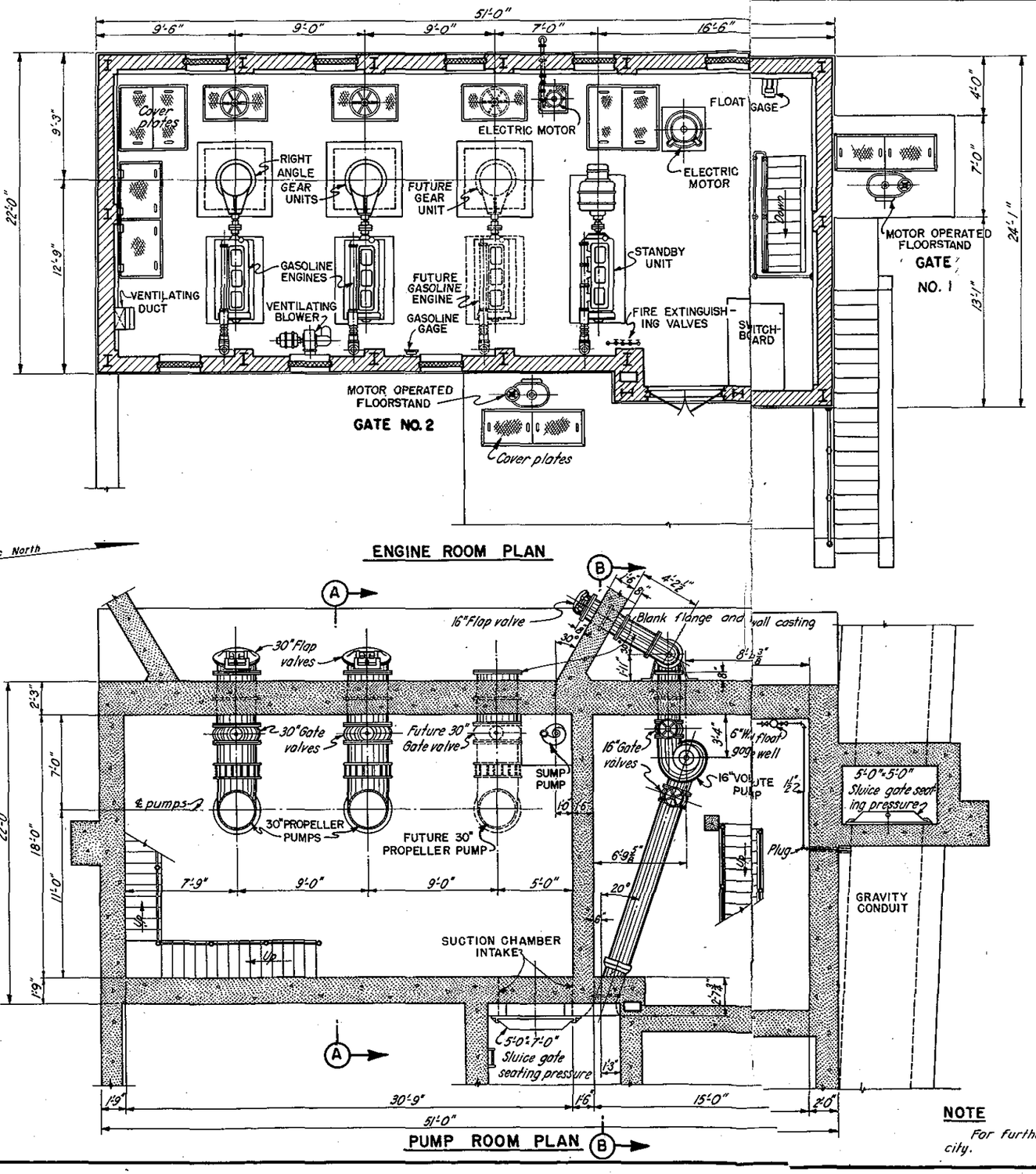
20' 0 20' 40'

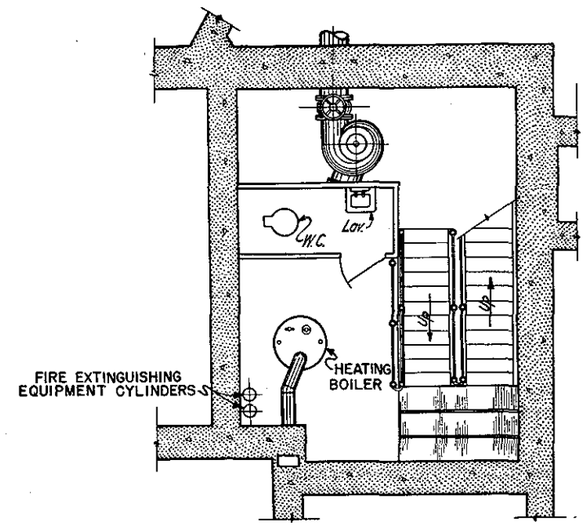
U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE XLVI





BOILER ROOM PLAN

FLOOD OPERATION INSTRUCTIONS

Close sluice gate No. 1 on gravity conduit open both 16" gate valves and check flap valve on volute pump line. Operate volute pump to maintain water level in inlet between elevation 47.0 and elevation 49.0. If inflow of water exceeds capacity of volute pump to maintain 49.0 as a maximum elevation, Open gate No. 2 to suction chamber and operate one or more of the 30" pumps to maintain the water level between 47.0 and 52.0 in the suction chamber. Open the 30" gate valves on pump discharge before starting pumps. Do not operate pumps when water level in suction is below elevation 47.0.

NOTE

For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

PADEREWSKI PUMPING STATION

CHICOPEE, MASS.

GENERAL ARRANGEMENT OF EQUIPMENT NO. 1

CONNECTICUT RIVER — MASSACHUSETTS

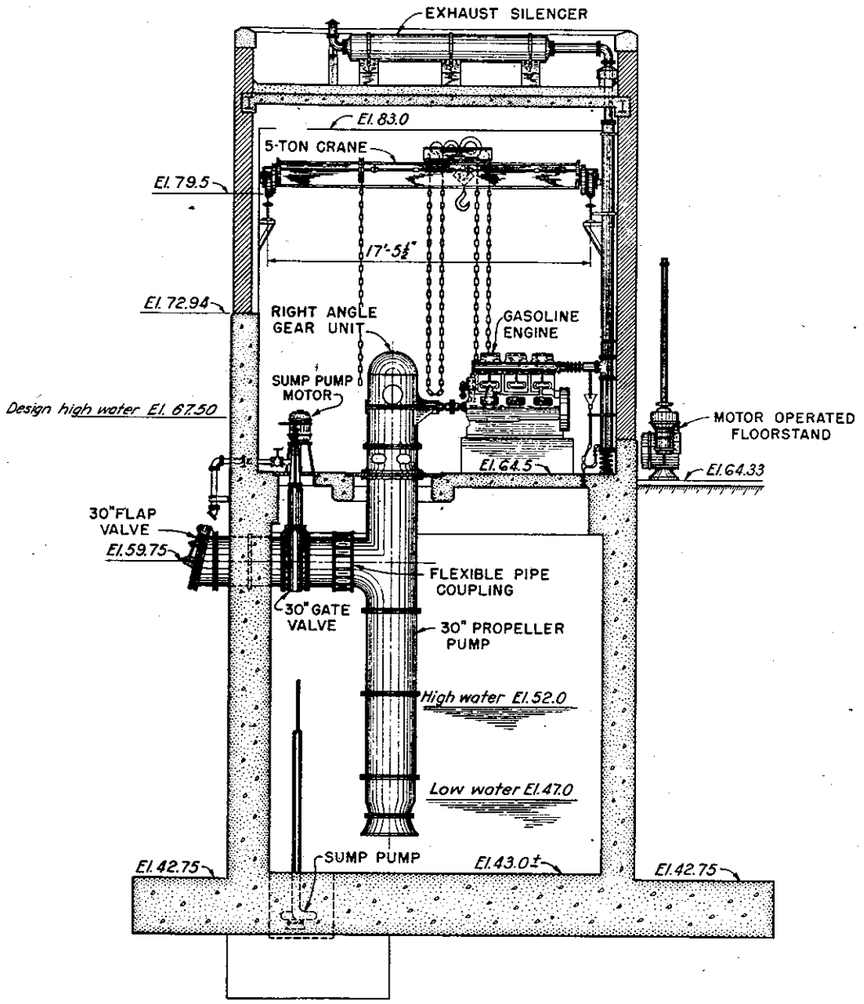
SCALE: 1/4 IN. = 1 FT.

U. S. ENGINEER OFFICE, PROVIDENCE, R.I.,

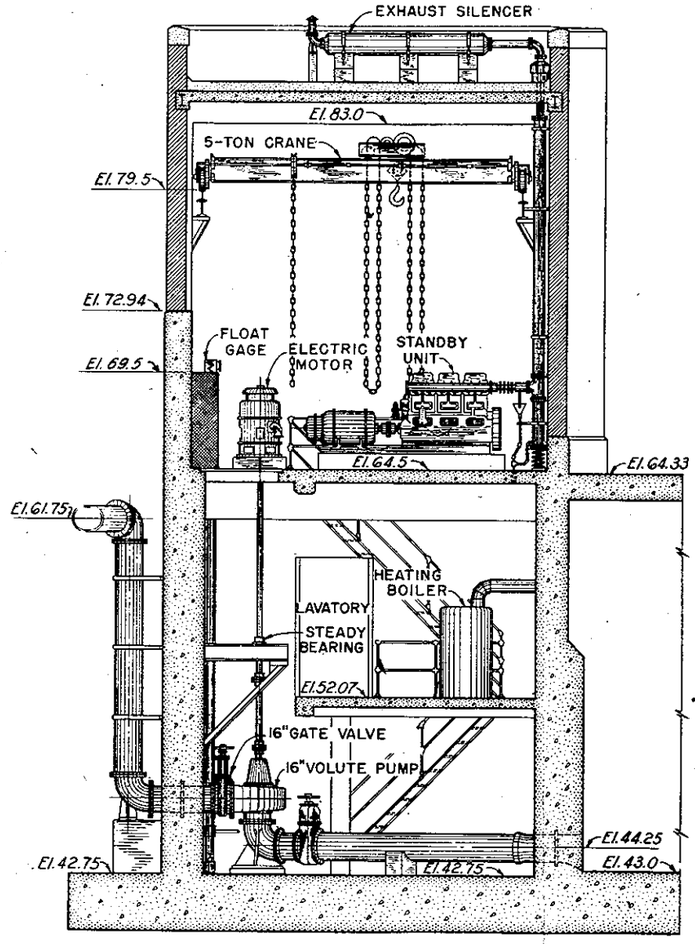
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE XLVII



SECTION A



SECTION B

CONNECTICUT RIVER FLOOD CONTROL

PADEREWSKI PUMPING STATION

CHICOPEE, MASS.

GENERAL ARRANGEMENT OF EQUIPMENT NO. 2

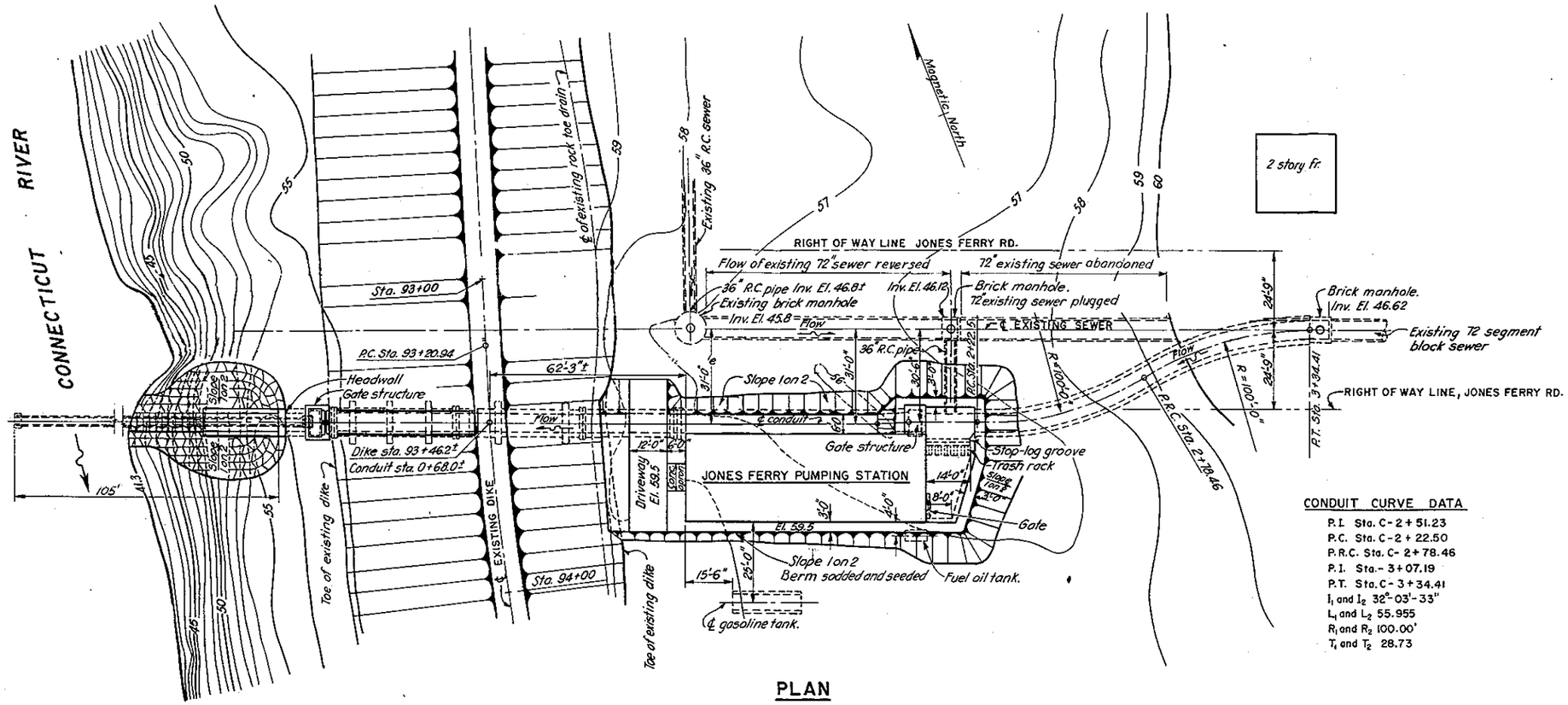
CONNECTICUT RIVER MASSACHUSETTS

SCALE: 1/4 IN. = 1 FT.

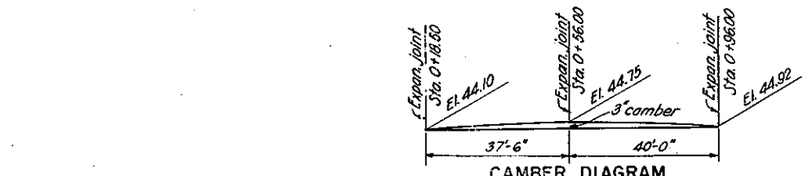
U. S. ENGINEER OFFICE, PROVIDENCE, R.I.

OPERATION AND MAINTENANCE MANUAL

CHICOPEE MASS

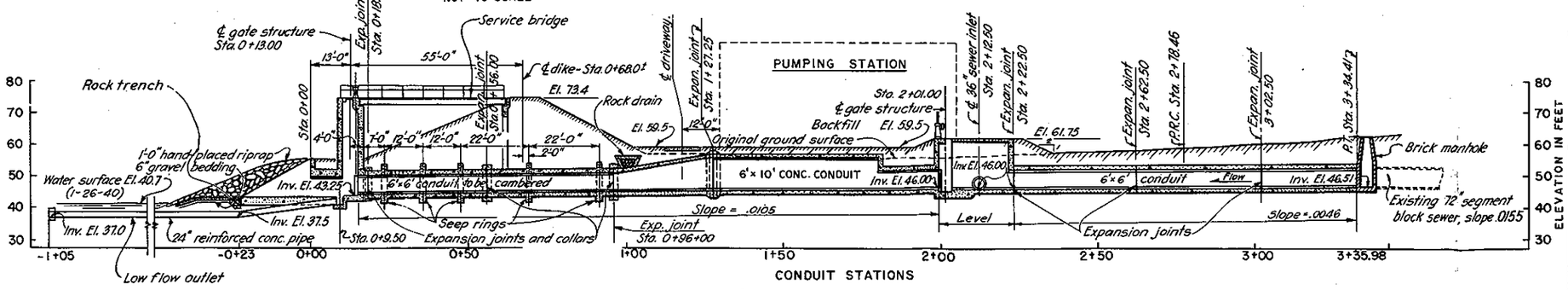


PLAN



CAMBER DIAGRAM

NOT TO SCALE



PROFILE ALONG ℄ CONDUIT

NOTE

Elevations refer to Mean Sea Level Datum
For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

JONES FERRY PUMPING STATION

CHICOPEE, MASS.

GENERAL PLAN

CONNECTICUT RIVER MASSACHUSETTS

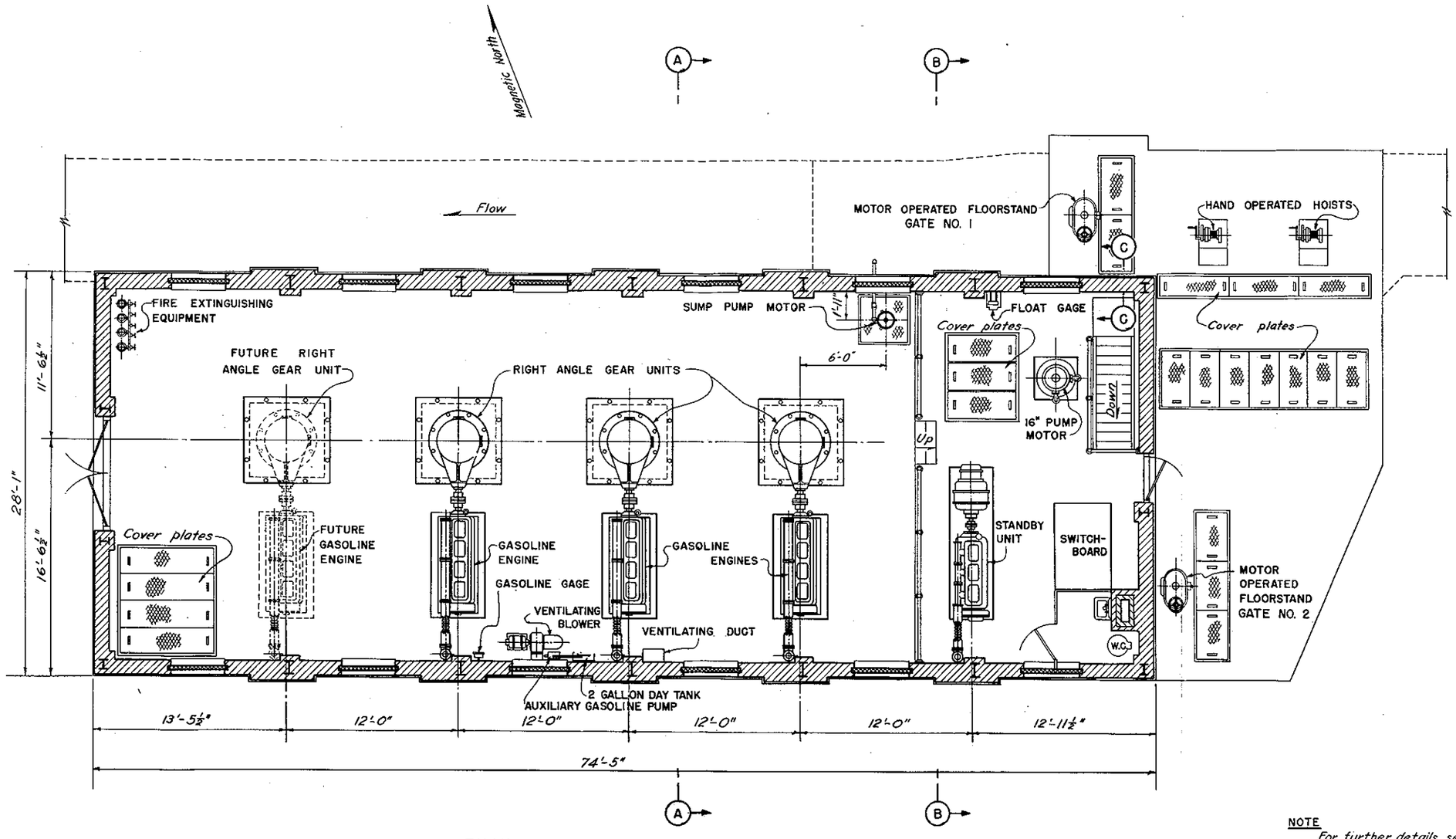
SCALE: 1 IN. = 20 FT.

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE XLIX



ENGINE ROOM PLAN

NOTE

For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

JONES FERRY PUMPING STATION

CHICOPEE, MASS.

GENERAL ARRANGEMENT OF EQUIPMENT NO. 1

CONNECTICUT RIVER MASSACHUSETTS

SCALE 1/4 IN. = 1 FT.

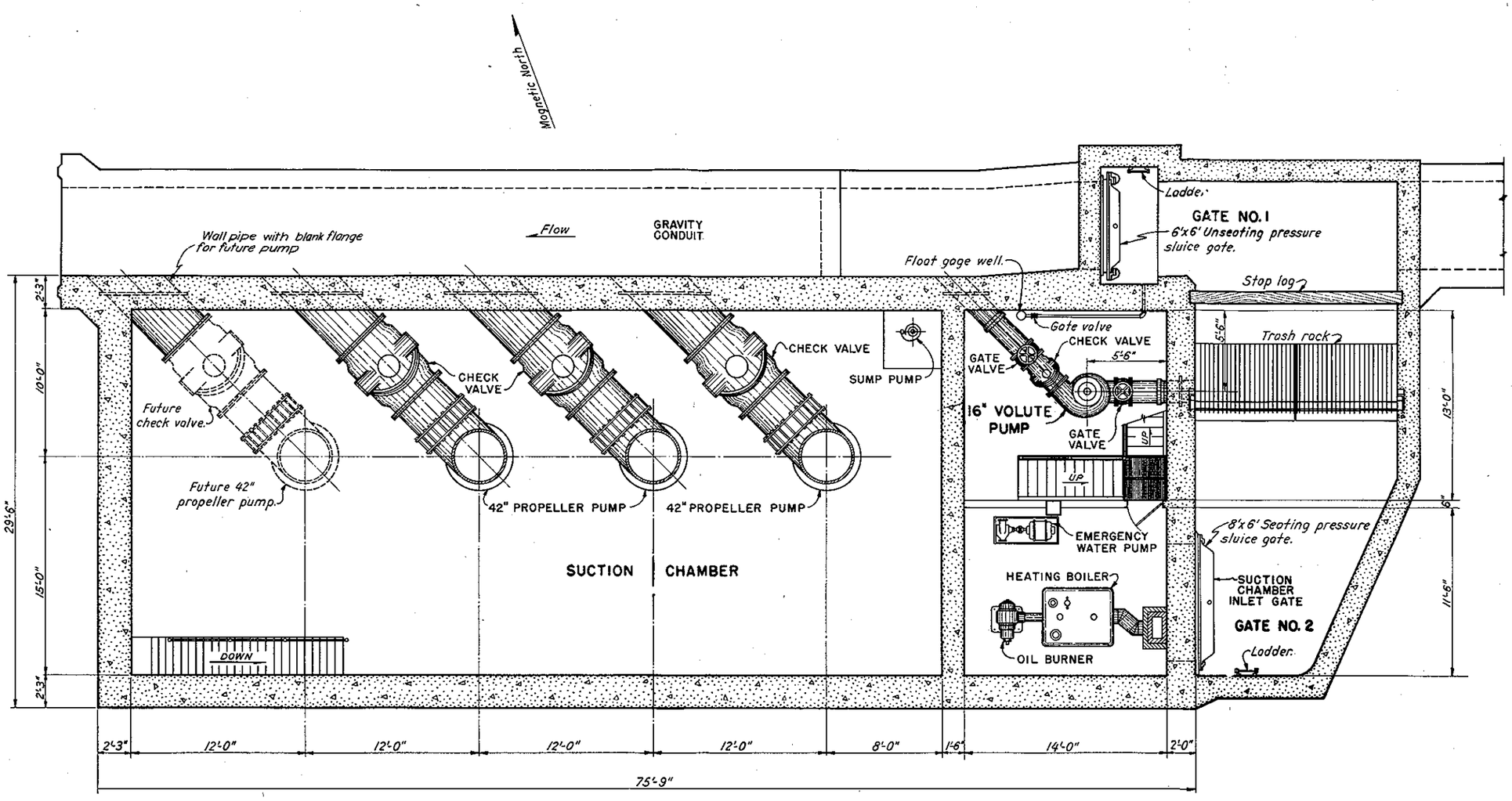
0 5' 10'

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE L



PUMP ROOM PLAN

FLOOD OPERATION INSTRUCTIONS

Close sluice gate No. 1 on gravity conduit. Open both 16" gate valves on volute pump line. Operate volute pump to maintain water level in inlet chamber between elevation 49.5 and elevation 52.0. If inflow of water exceeds capacity of volute pump, to maintain 49.5 as a maximum elevation, open gate No. 2 to suction chamber and operate one or more of the 42" pumps to maintain the water level between elevation 46.0 and elevation 52.0 in the suction chamber. Do not operate these pumps when the water level is below elevation 46.0.

NOTES

For further details see contract drawings furnished city.

CONNECTICUT RIVER FLOOD CONTROL

JONES FERRY PUMPING STATION

CHICOPEE, MASS.

GENERAL ARRANGEMENT OF EQUIPMENT NO. 2

CONNECTICUT RIVER MASSACHUSETTS

SCALE 1/4 IN. = 1 FT.

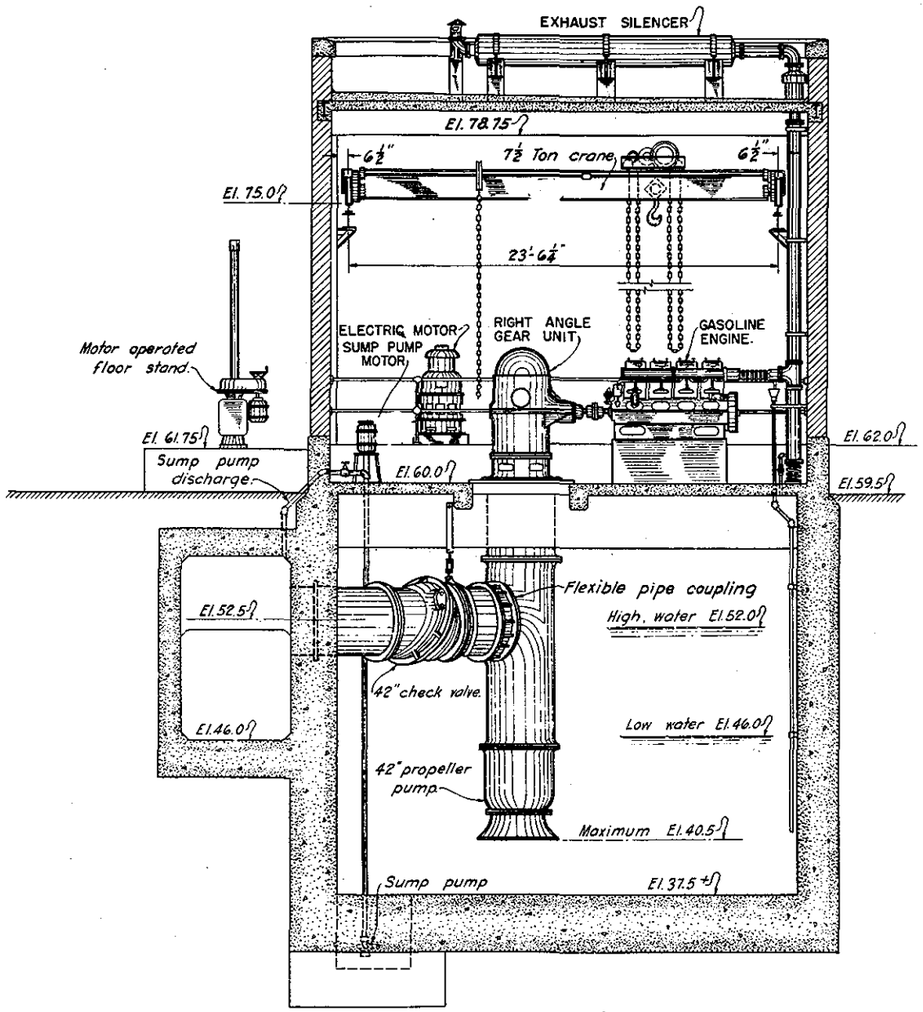
5' 0 5' 10'

U.S. ENGINEER OFFICE, PROVIDENCE, R. I.,

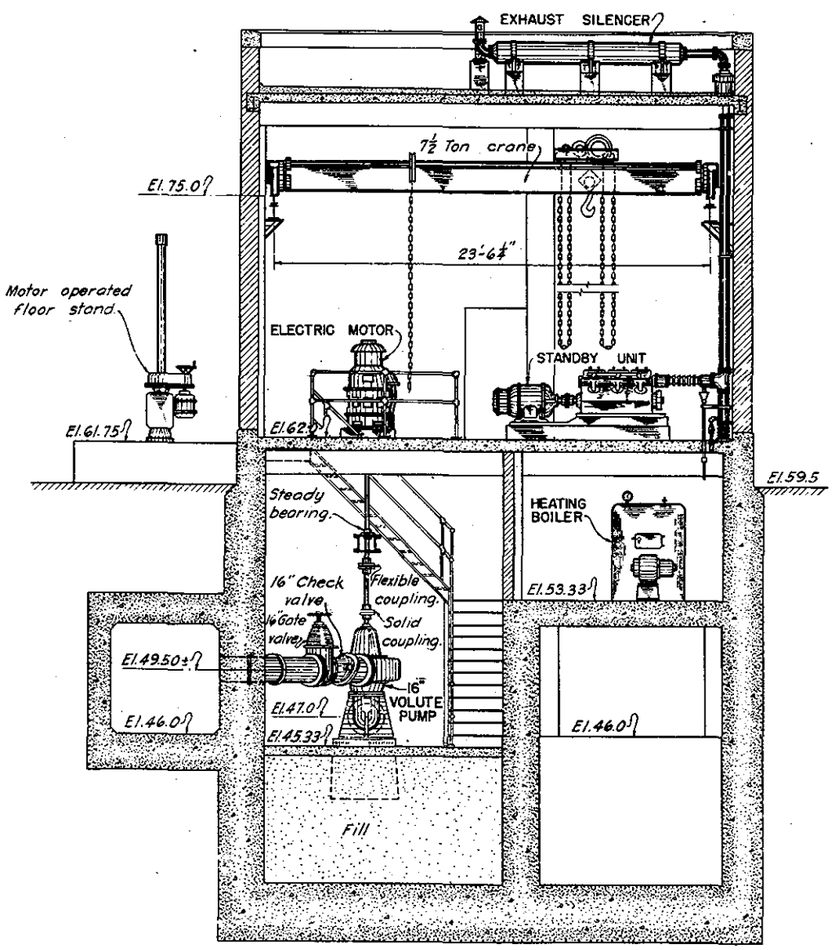
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

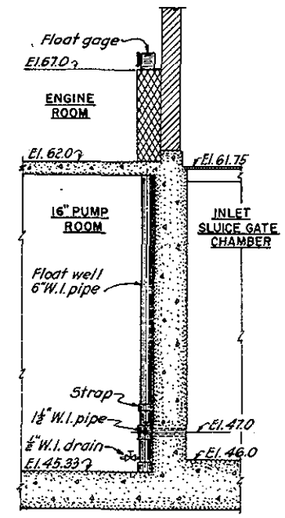
PLATE LI



SECTION A
SCALE: 1/4" = 1'-0"



SECTION B
SCALE: 1/4" = 1'-0"



SECTION C

CONNECTICUT RIVER FLOOD CONTROL

JONES FERRY PUMPING STATION

CHICOPEE, MASS.

GENERAL ARRANGEMENT OF EQUIPMENT NO. 3

CONNECTICUT RIVER MASSACHUSETTS

SCALE: 1/4 IN. = 1 FT.

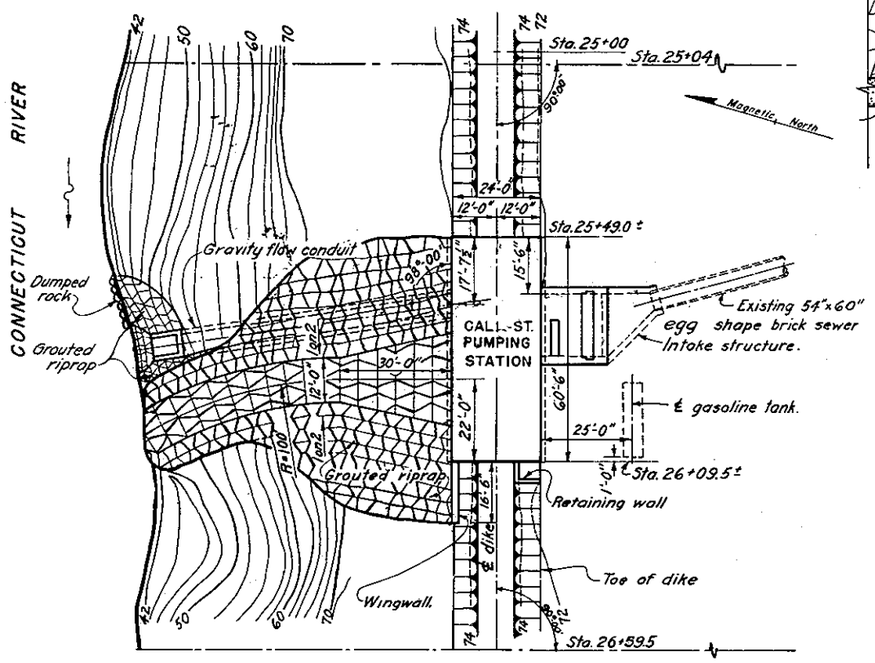
5' 0 5' 10'

U.S. ENGINEER OFFICE PROVIDENCE, R.I.

OPERATION AND MAINTENANCE MANUAL

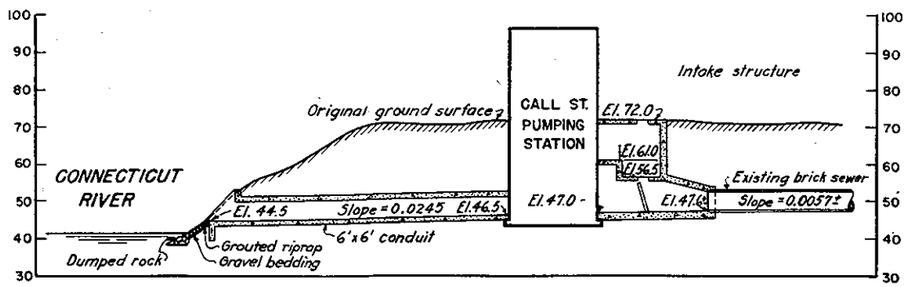
CHICOPEE, MASS

PLATE LII

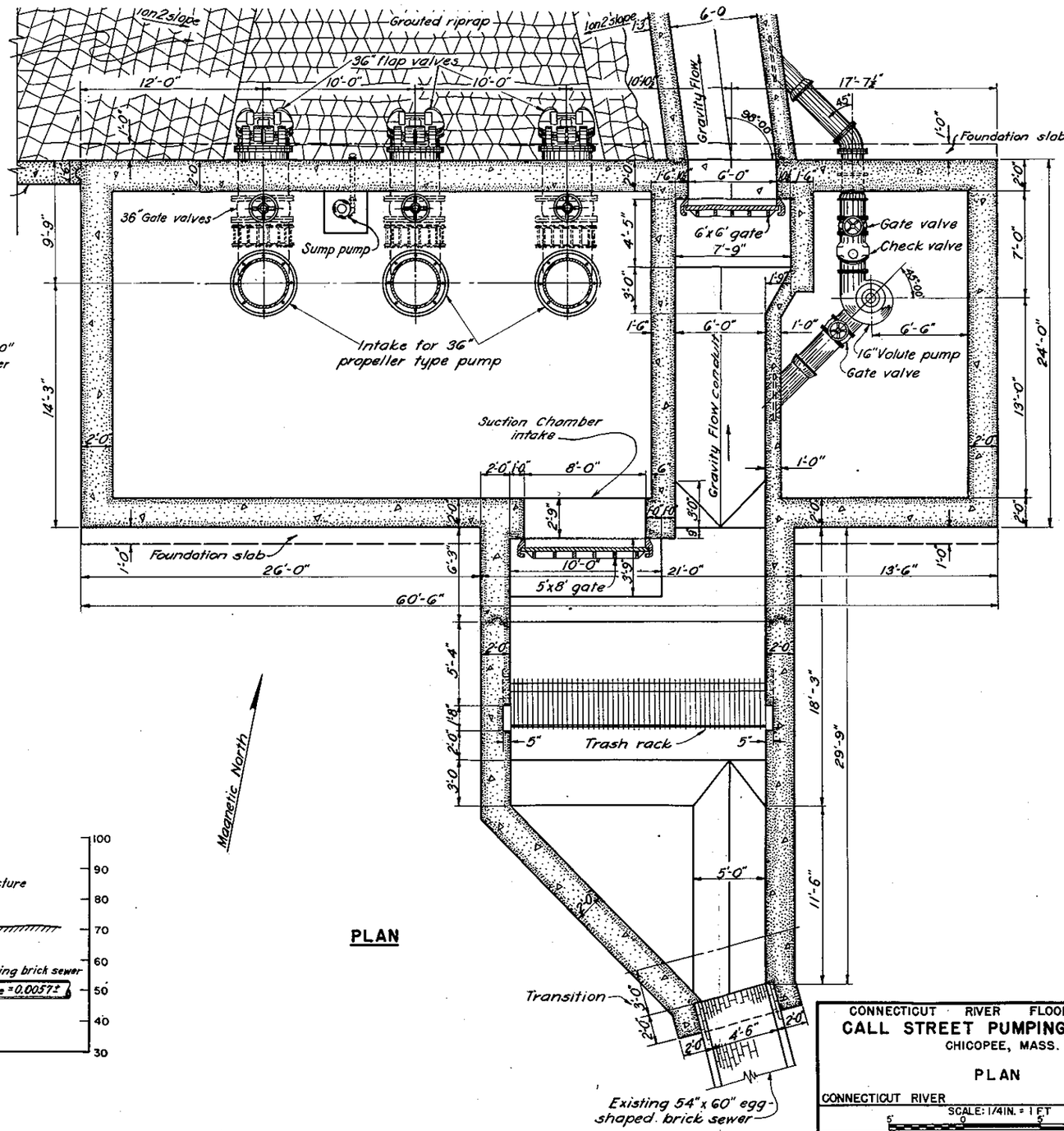


GENERAL PLAN

SCALE: 1" = 20'-0"



PROFILE ALONG ℄ OF CONDUIT



PLAN

CONNECTICUT RIVER FLOOD CONTROL

CALL STREET PUMPING STATION

CHICOPEE, MASS.

PLAN

CONNECTICUT RIVER MASSACHUSETTS

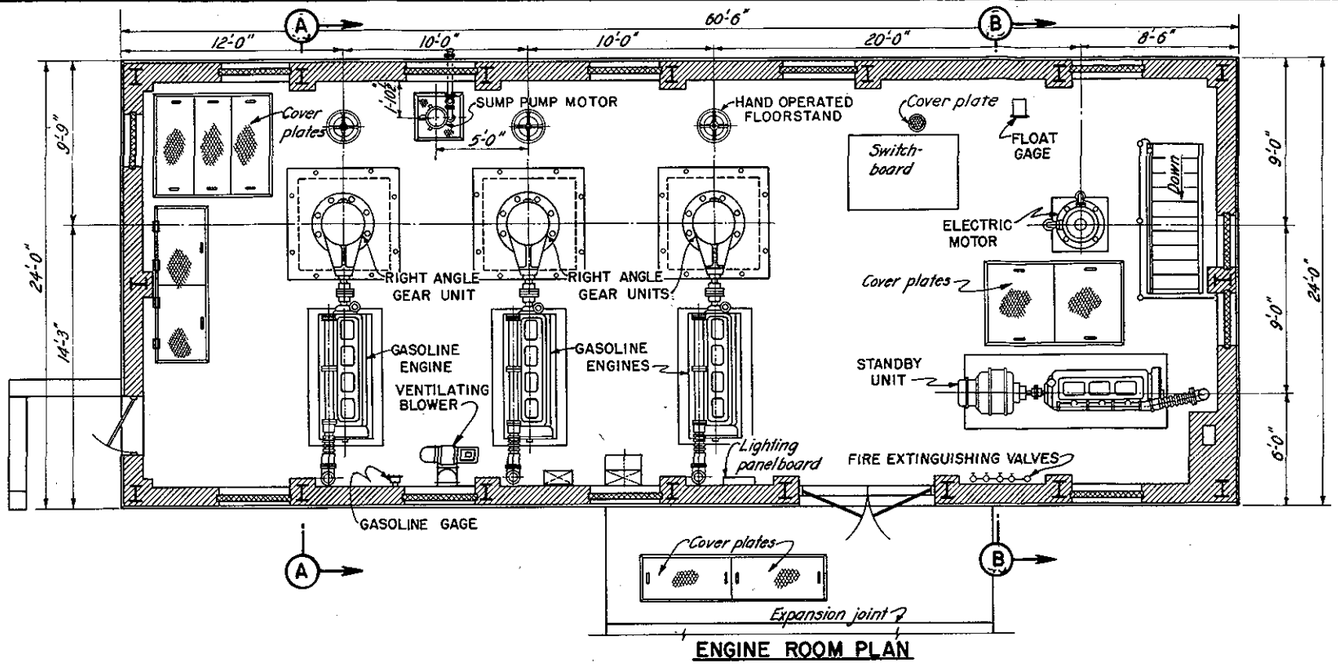
SCALE: 1/4IN. = 1 FT

U. S. ENGINEER OFFICE, PROVIDENCE, R.I.,

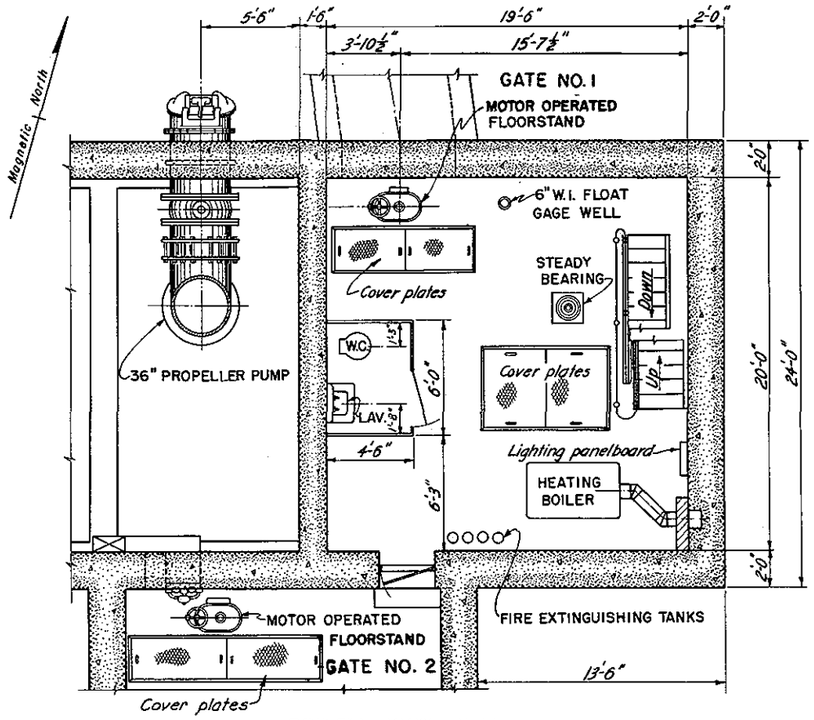
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS.

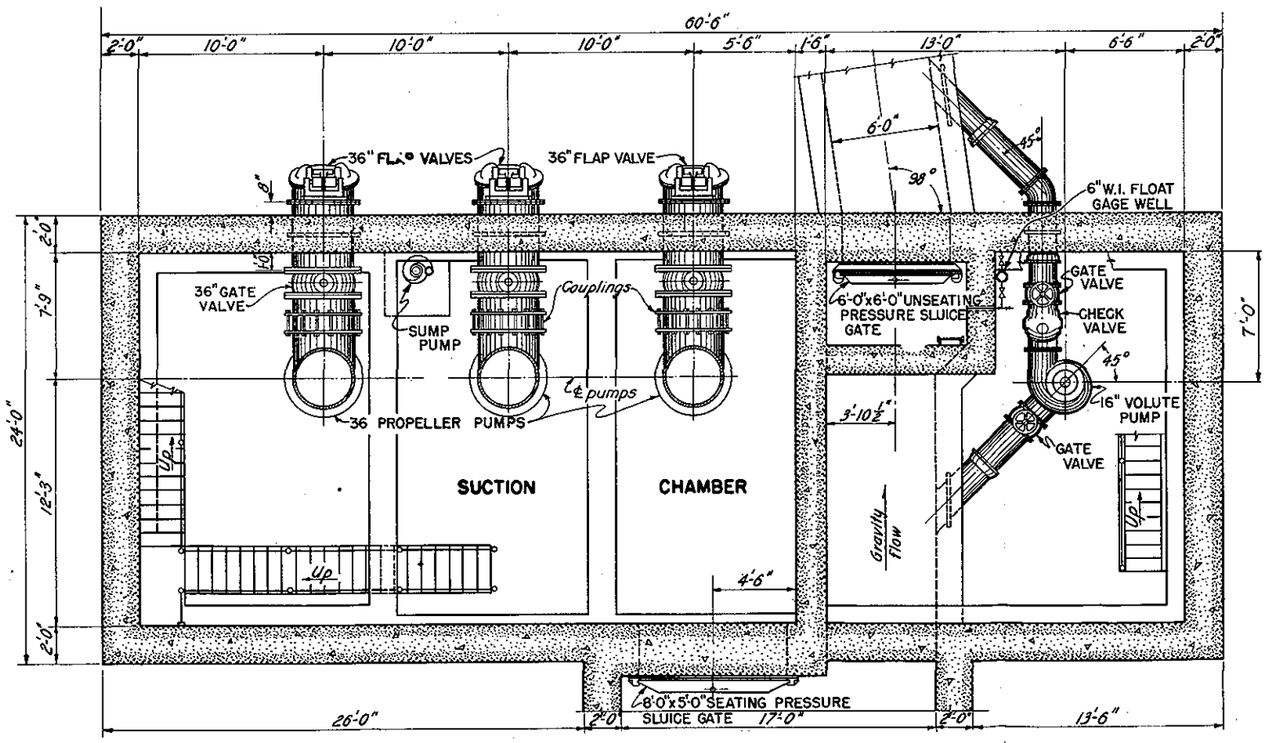
PLATE LIII



ENGINE ROOM PLAN



BOILER ROOM PLAN



PUMP ROOM PLAN

FLOOD OPERATION INSTRUCTIONS

Close sluice gate No. 1 on gravity conduit. Open both 16" gate valves on volute pump line. Operate volute pump to maintain water level in inlet between elevation 51.0 and elevation 53.0. If inflow of water exceeds capacity of volute pump, to maintain 53.0 as a maximum elevation, Open sluice gate No. 2 to suction chamber and operate one or more of the 36 inch pumps to maintain the water level between elevation 51.0 and elevation 55.0 in the suction chamber. Open the 36 inch gate valves on pump dicharge before starting pumps. Do not operate pumps when water level in suction chamber is below elevation 51.0.

CONNECTICUT RIVER FLOOD CONTROL

CALL STREET PUMPING STATION

CHICOPEE, MASS.

GENERAL ARRANGEMENT OF EQUIPMENT NO. 1

CONNECTICUT RIVER — MASSACHUSETTS

SCALE: 1/4 IN. = 1 FT.

5 0 5 10'

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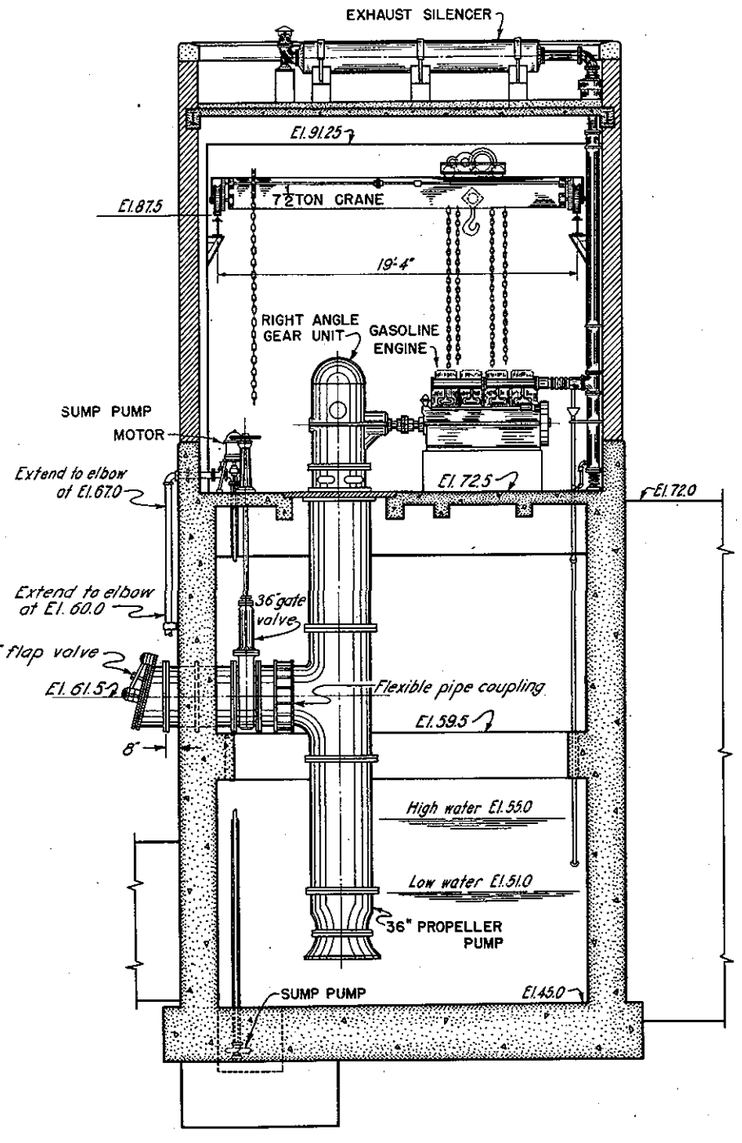
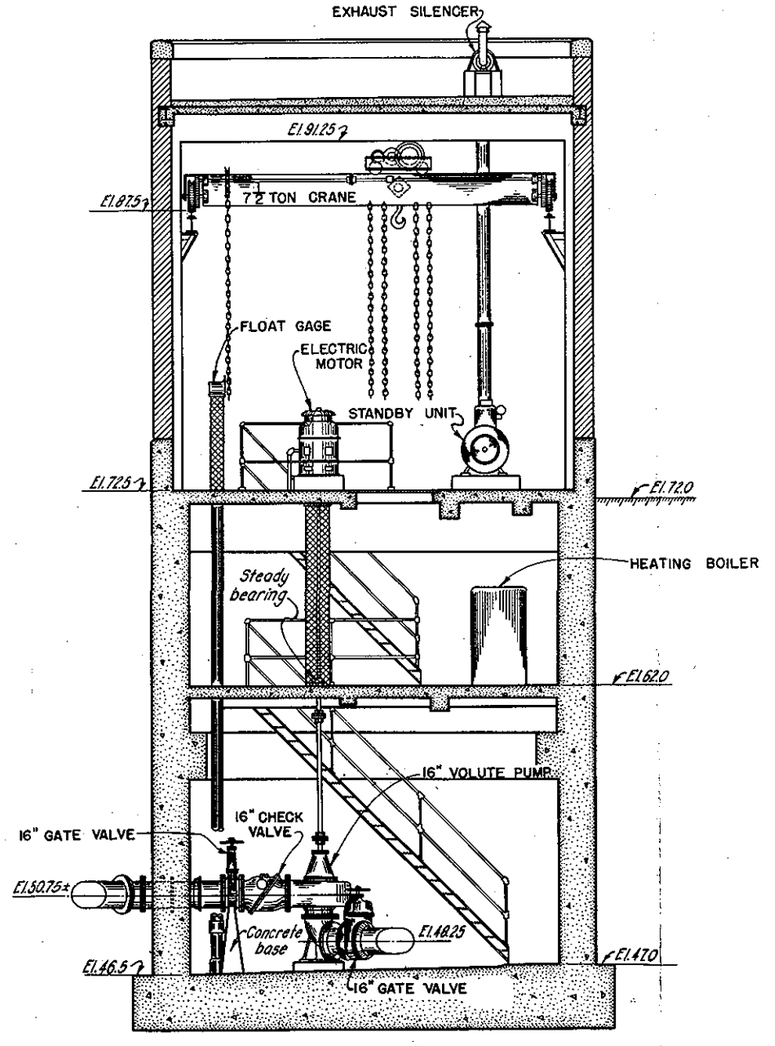
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS



SECTION A



SECTION B

CONNECTICUT RIVER FLOOD CONTROL

CALL STREET PUMPING STATION

CHICOPEE, MASS.

GENERAL ARRANGEMENT OF EQUIPMENT NO. 2

CONNECTICUT RIVER MASSACHUSETTS

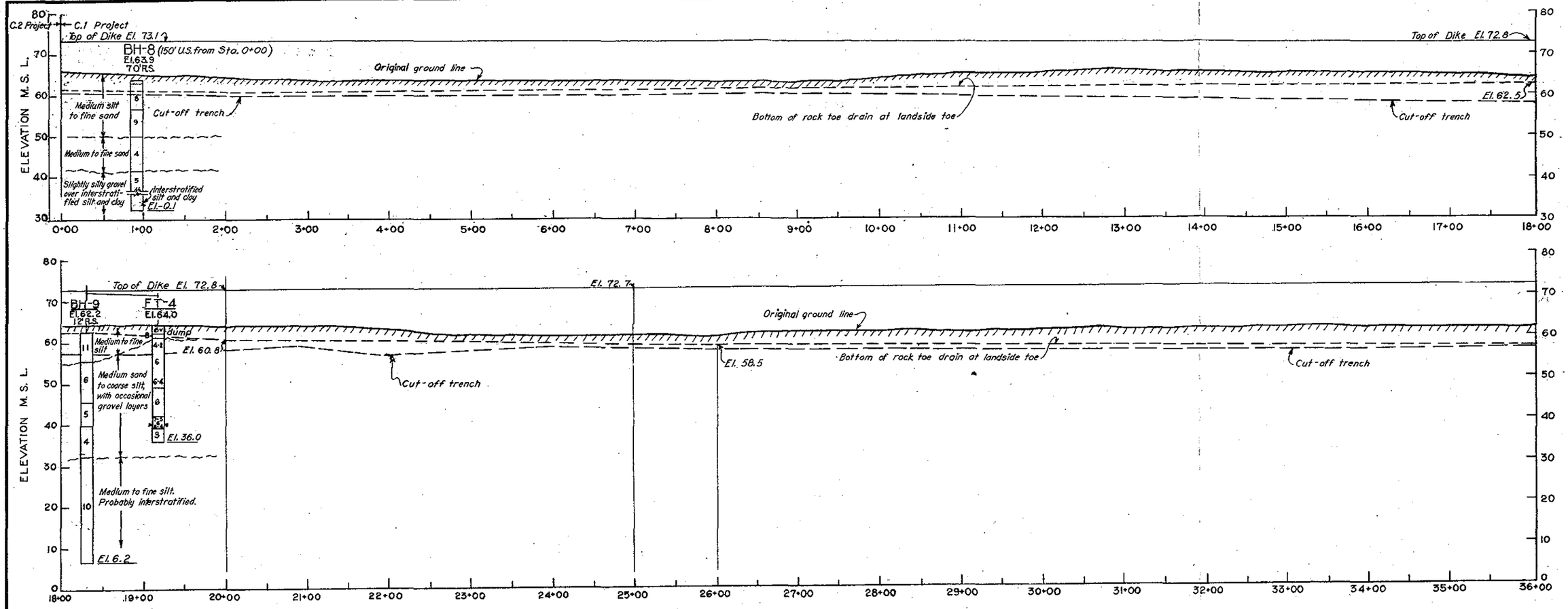
SCALE: 1/4 IN. = 1 FT.

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS

PLATE LV



NOTES

For general notes, legend, and description of numerical soil classes, see Plate LVII.

Offsets from ℄ are approximate.

Dike Station 0+00 on C.1 Project corresponds with Station 107+43.37 on C.2 Project. Dike Station 44.87.57 on C.1 Project corresponds with Station 152+30.94 on C.2 Project.

KEY	DATE	REVISION (indicated by △)	REV.BY	CK. BY	AP. BY

CONNECTICUT RIVER FLOOD CONTROL

CHICOPEE DIKE

SOIL PROFILE - INITIAL FISCAL YEAR 1939 UNIT

CONNECTICUT RIVER MASSACHUSETTS

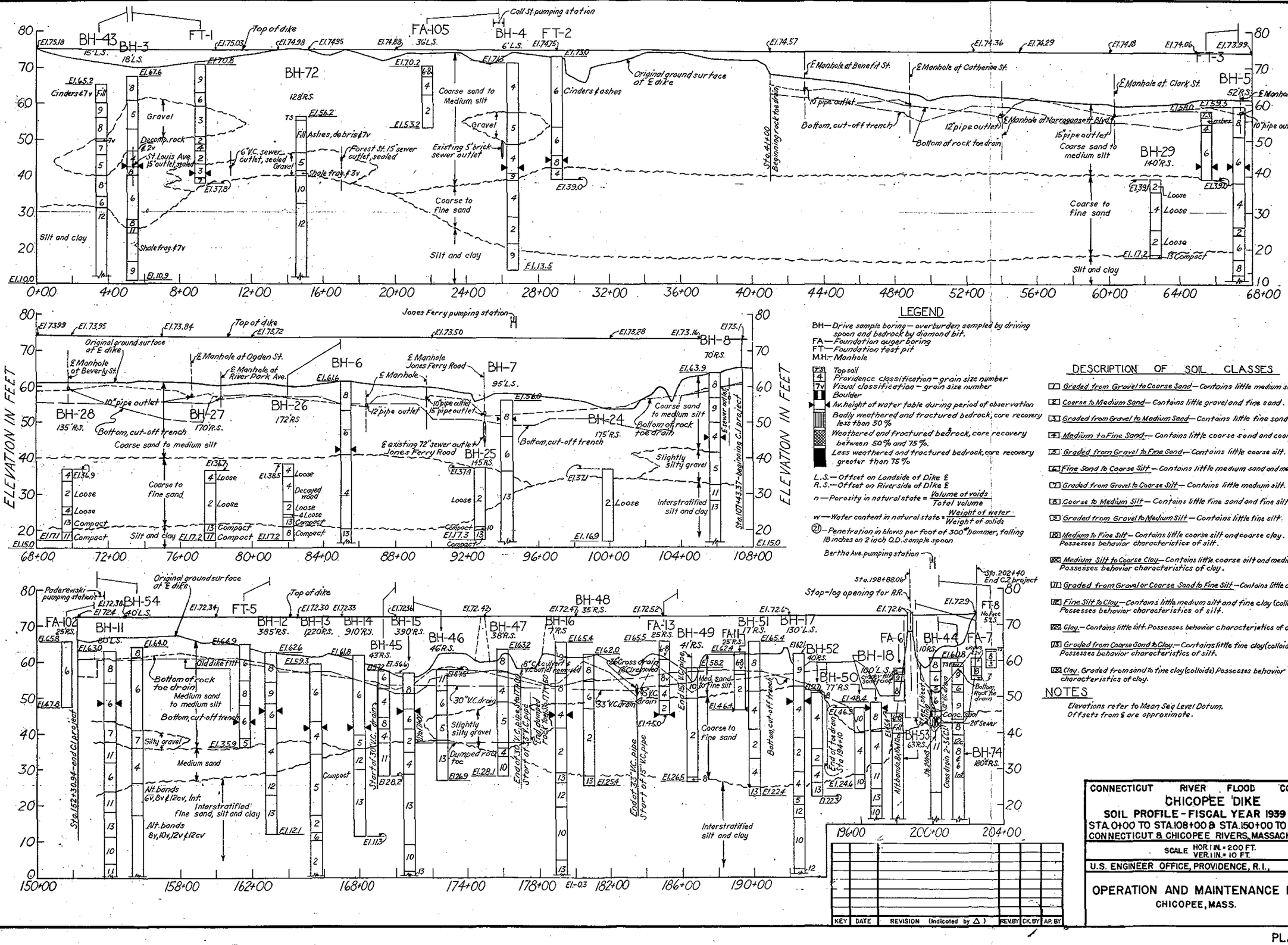
SCALE HOR. 1 IN. = 50 FT. VER. 1 IN. = 10 FT.

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS.

PLATE LVI



LEGEND

BH—Drive sample boring—overburden sampled by driving spoon and bedrock by diamond bit.
FA—Foundation auger boring
FT—Foundation test pit
M.H.—Manhole

- Ts — Topsoil
- 4 — Providence classification—grain size number
- 7v — Visual classification—grain size number
- Boulder
- Av. height of water table during period of observation
- Badly weathered and fractured bedrock, core recovery less than 50%
- Weathered and fractured bedrock, core recovery between 50% and 75%.
- Less weathered and fractured bedrock, core recovery greater than 75%

L.S.—Offset on Landside of Dike ℄
R.S.—Offset on Riverside of Dike ℄
n—Porosity in natural state = Volume of voids / Total volume
w—Water content in natural state = Weight of water / Weight of solids
(21)—Penetration in blows per foot of 300# hammer, falling 18 inches on 2 inch O.D. sample spoon

DESCRIPTION OF SOIL CLASSES

- GW — Graded from Gravel to Coarse Sand—Contains little medium sand
- GC — Coarse to Medium Sand—Contains little gravel and fine sand.
- SW — Graded from Gravel to Medium Sand—Contains little fine sand.
- SC — Medium to Fine Sand—Contains little coarse sand and coarse silt.
- GM — Graded from Gravel to Fine Sand—Contains little coarse silt.
- SM — Fine Sand to Coarse Silt—Contains little medium sand and medium silt.
- GM — Graded from Gravel to Coarse Silt—Contains little medium silt.
- ML — Coarse to Medium Silt—Contains little fine sand and fine silt.
- GM — Graded from Gravel to Medium Silt—Contains little fine silt.
- MH — Medium to Fine Silt—Contains little coarse silt and coarse clay. Possesses behavior characteristics of silt.
- MC — Medium Silt to Coarse Clay—Contains little coarse silt and medium clay. Possesses behavior characteristics of clay.
- GM — Graded from Gravel or Coarse Sand to Fine Silt—Contains little coarse clay.
- CL — Fine Silt to Clay—Contains little medium silt and fine clay (colloids) Possesses behavior characteristics of silt.
- CL — Clay—Contains little silt. Possesses behavior characteristics of clay.
- GC — Graded from Coarse Sand to Clay—Contains little fine clay (colloids) Possesses behavior characteristics of silt.
- CH — Clay. Graded from sand to fine clay (colloids) Possesses behavior characteristics of clay.

NOTES

Elevations refer to Mean Sea Level Datum.
Offsets from ℄ are approximate.

KEY	DATE	REVISION (Indicated by △)	REV.BY	CK.BY	AP. BY

CONNECTICUT RIVER FLOOD CONTROL

CHICOPEE DIKE

SOIL PROFILE - FISCAL YEAR 1939 UNIT
STA. 0+00 TO STA. 108+00 & STA. 150+00 TO 202+40
CONNECTICUT & CHICOPEE RIVERS, MASSACHUSETTS

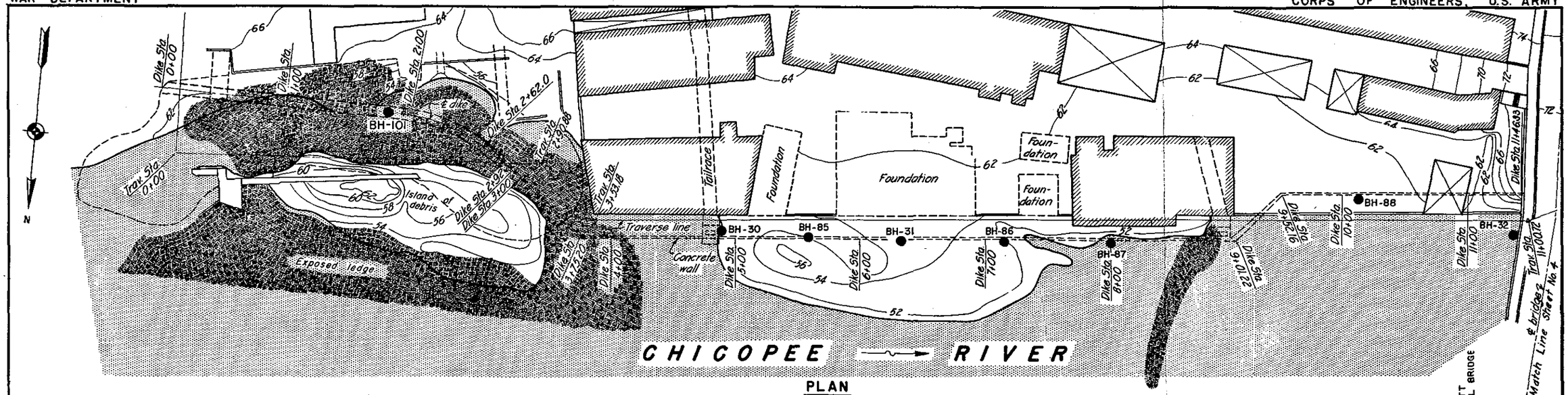
SCALE HOR. 1 IN. = 200 FT.
VER. 1 IN. = 10 FT.

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL
CHICOPEE, MASS.

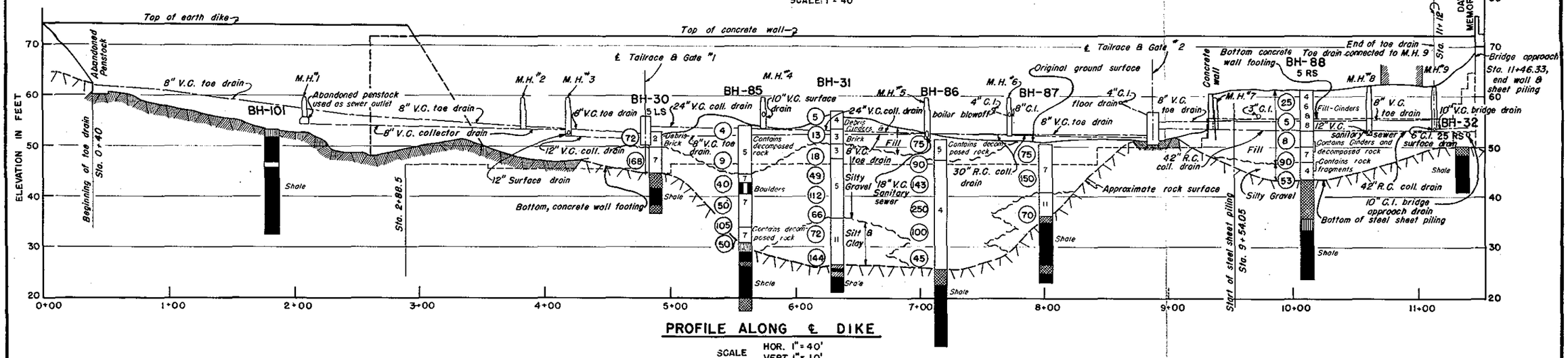
PLATE LVII

WAR DEPARTMENT — CORPS OF ENGINEERS, U.S. ARMY



PLAN

SCALE: 1" = 40'



PROFILE ALONG ℄ DIKE

SCALE HOR. 1" = 40'
VERT. 1" = 10'

NOTES:

For general notes, legend and description of soil classes, see Plate LVII.

KEY	DATE	REVISION (Indicated by Δ)	REV.BY	CH.BY	AP.BY

CONNECTICUT RIVER FLOOD CONTROL

DIKE - SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

SOIL PROFILE

CONNECTICUT RIVER — CHICOPEE, MASS.

SCALE: 1 IN. = 40 FT

U.S. ENGINEER OFFICE, PROVIDENCE, R.I. — MAY 1940

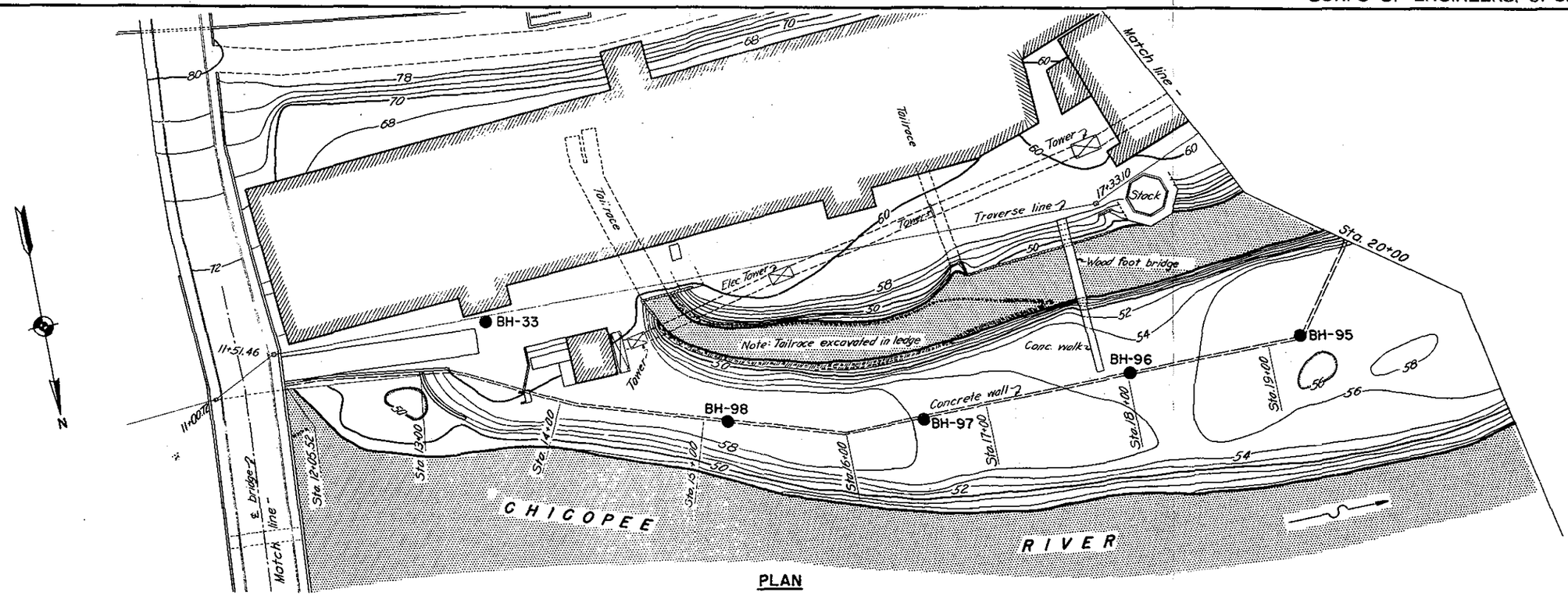
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS.

PLATE LVIII

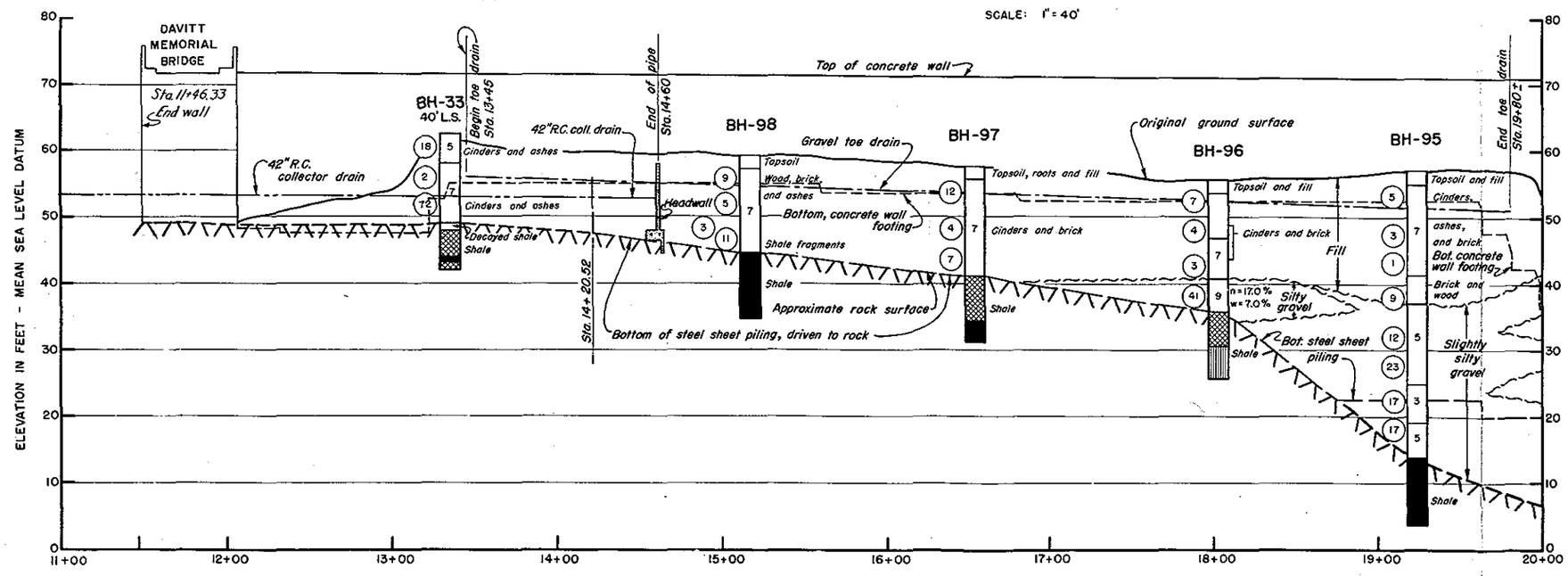
WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY



PLAN

SCALE: 1" = 40'



PROFILE ALONG ℄ WALL

SCALE: HOR. 1" = 40'
VERT. 1" = 10'

NOTE

For general notes, legend and description of soil classes see Plate No. LVII.

KEY	DATE	REVISION (Indicated by Δ)	REV. BY	CK. BY	AP. BY

CONNECTICUT RIVER FLOOD CONTROL

DIKE-SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

SOIL PROFILE

CONNECTICUT RIVER — CHICOPEE, MASS.

SCALE: 1 IN. = 40 FT.

U. S. ENGINEER OFFICE, PROVIDENCE, R. I.,

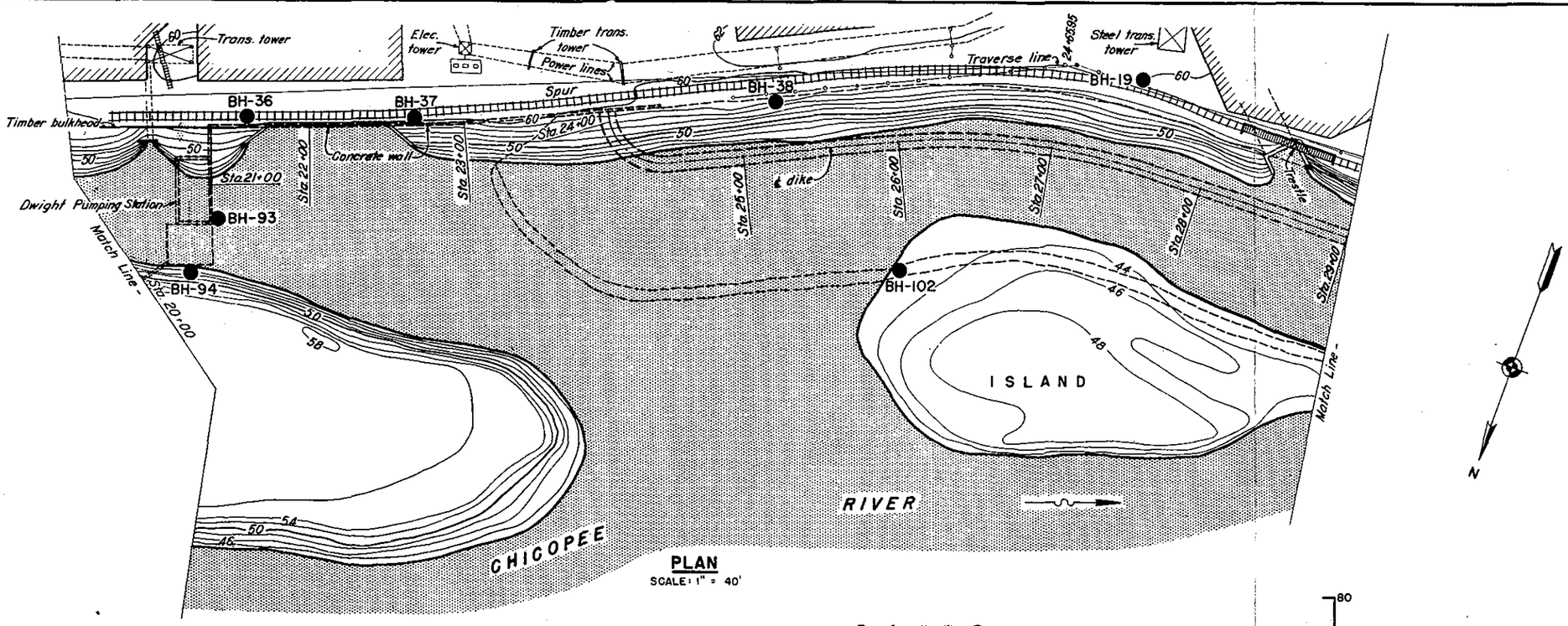
OPERATION AND MAINTENANCE MANUAL

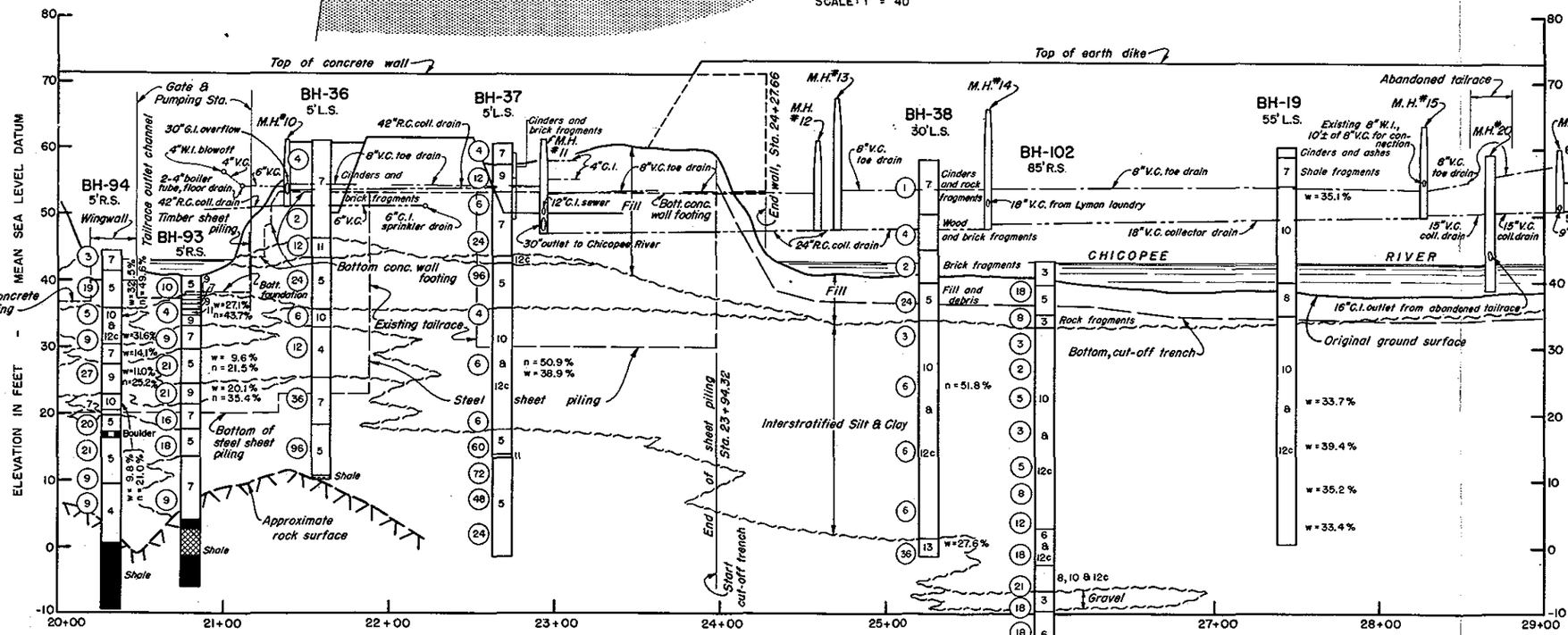
CHICOPEE, MASS.

PLATE LIX

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY





PROFILE ALONG ℄ DIKE

SCALE HOR. 1" = 40'
VERT. 1" = 10'

NOTES

For general notes, legend, and description of soil classes, see Plate LVII.

Classes 10 and 12c indicated in bore hole records generally occur in alternating bands, having thin layers of clay interbedded with thicker layers of coarse to fine silt.

KEY	DATE	REVISION (Indicated by Δ)	REV. BY	CK. BY	AP. BY

CONNECTICUT RIVER FLOOD CONTROL

DIKE-SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

SOIL PROFILE

CONNECTICUT RIVER — CHICOPEE, MASS.

SCALE: 1 IN. = 40 FT.

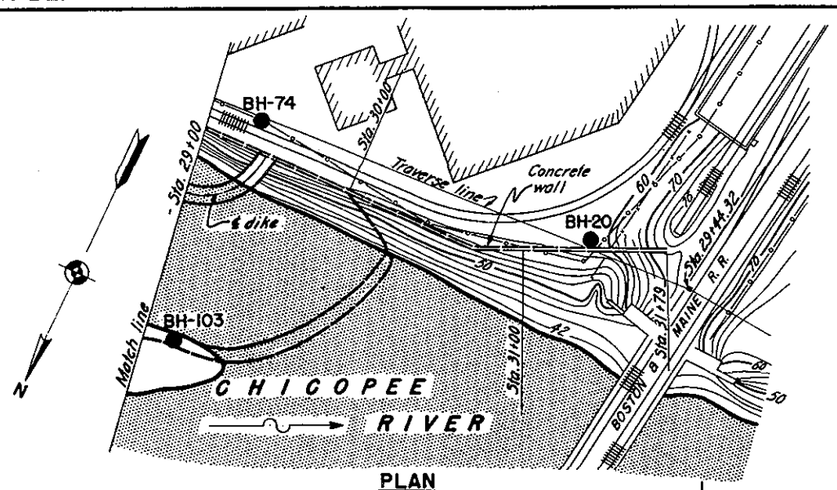
40' 0 40' 80'

U. S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

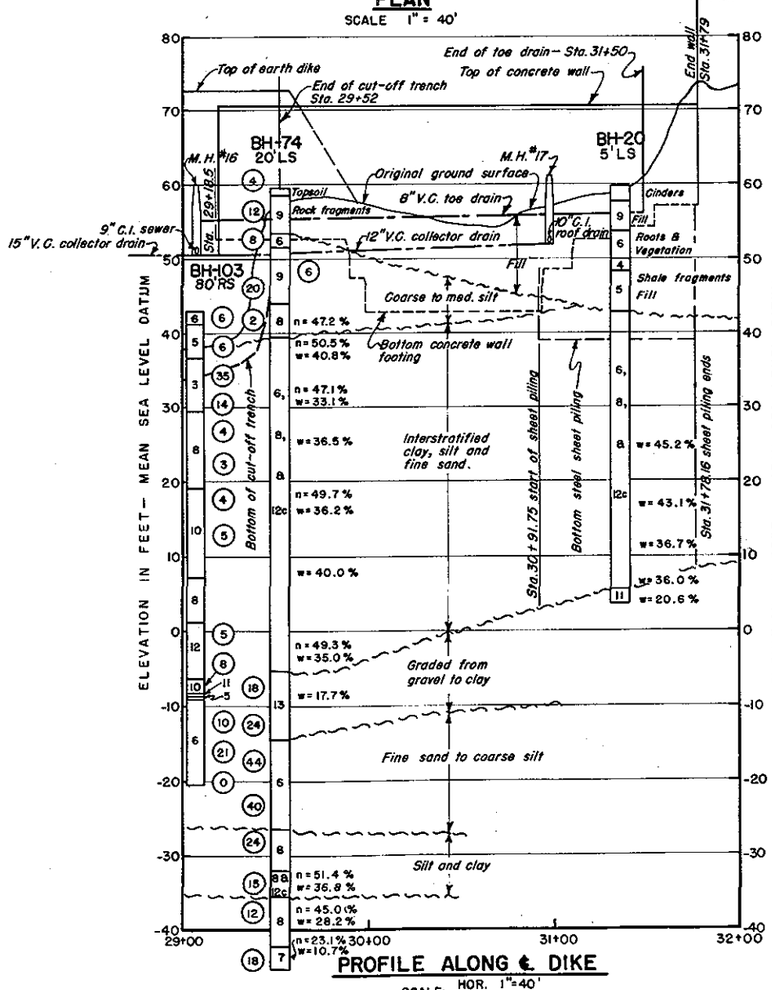
CHICOPEE, MASS.

PLATE LX



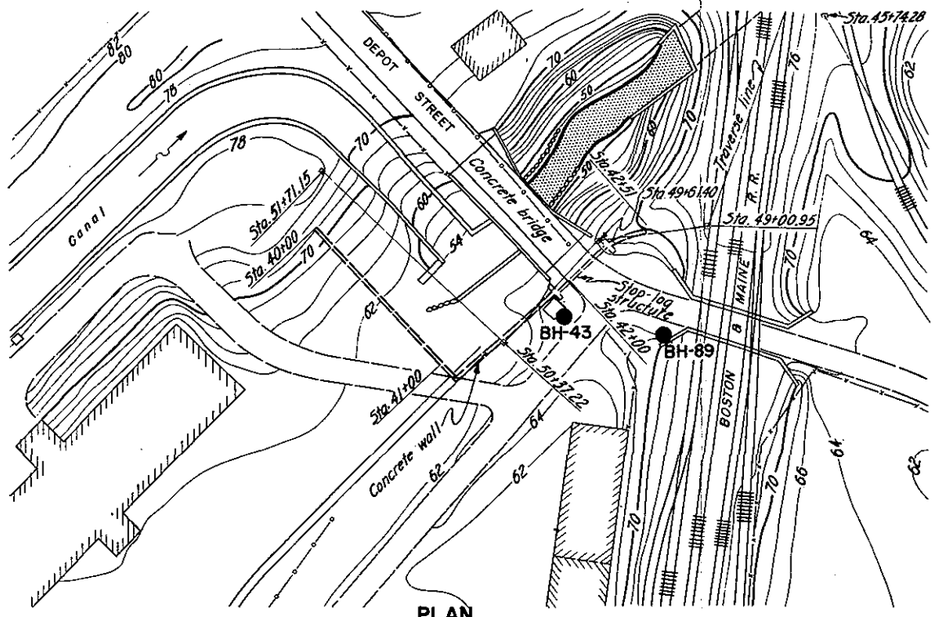
PLAN

SCALE 1" = 40'



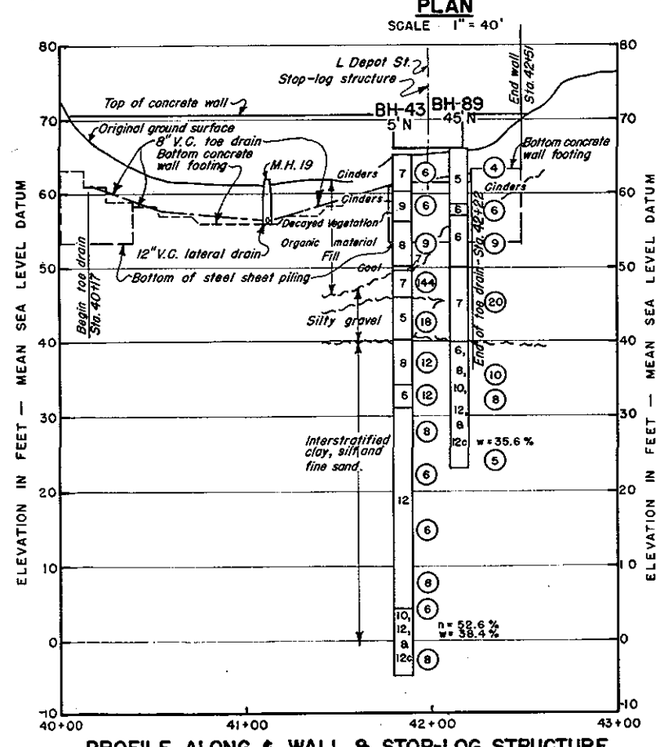
PROFILE ALONG ℄ DIKE

SCALE: HOR. 1"=40'
VER. 1"=10'



PLAN

SCALE 1" = 40'



PROFILE ALONG ℄ WALL & STOP-LOG STRUCTURE

SCALE: HOR. 1"=40'
VER. 1"=10'

NOTES

For general notes, legend, and description of soil classes, see Plate LVII.
N indicates north of wall ℄.
Classes 6, 8, 10, 12 and 12c indicated in bore hole records generally occur in alternating bands, having thin layers of clay interbedded with thicker layers of fine sand and silt.

KEY	DATE	REVISION (Indicated by Δ)	REV. BY	CK. BY	AP. BY

CONNECTICUT RIVER FLOOD CONTROL

DIKE SOUTH BANK CHICOPEE RIVER AND DWIGHT PUMPING STATION

SOIL PROFILE

CONNECTICUT RIVER — CHICOPEE, MASS.

SCALE 1 IN = 40 FT.

U.S. ENGINEER OFFICE, PROVIDENCE, R.I., MAY 1940

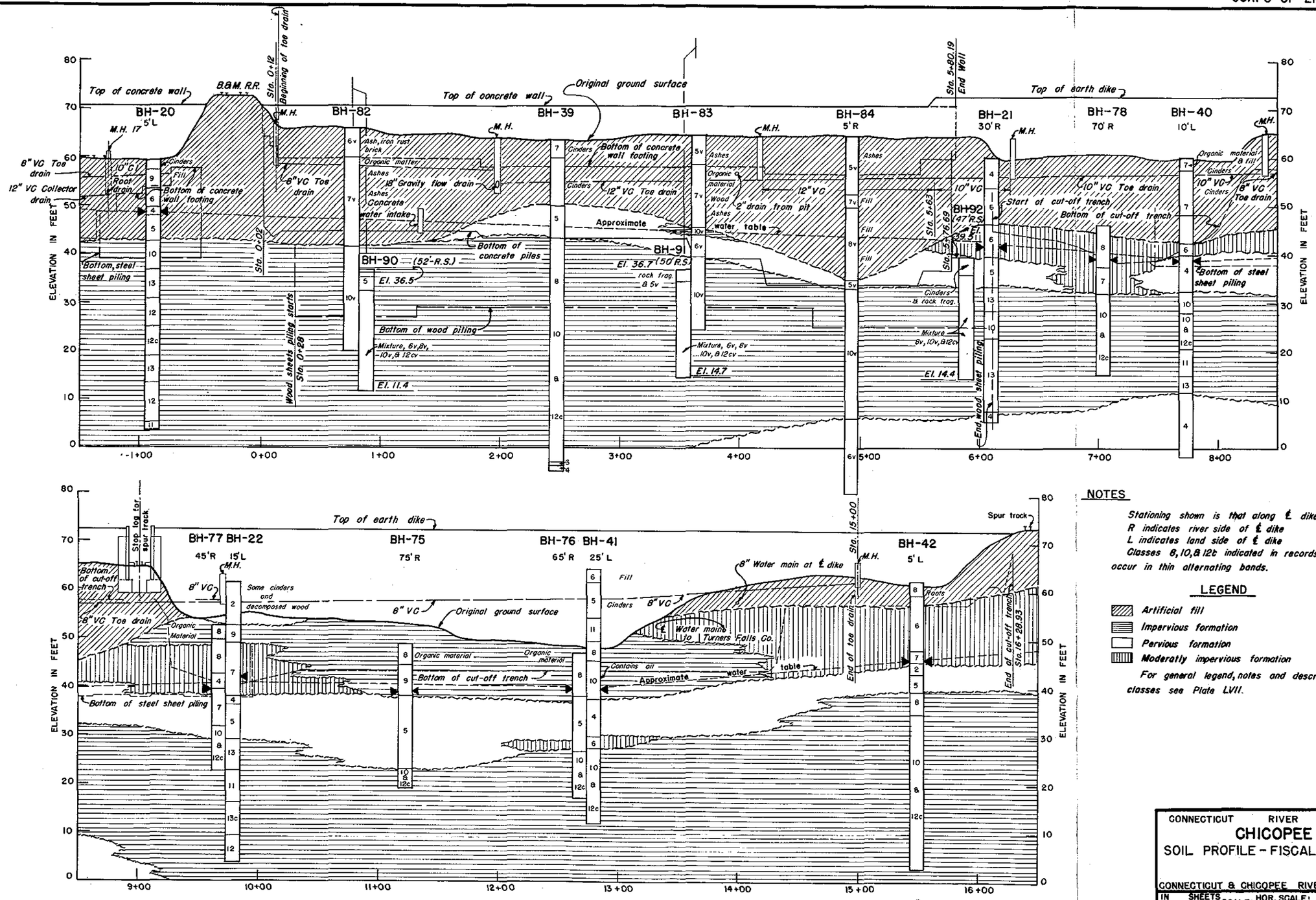
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS.

PLATE LXI

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY



NOTES

Stationing shown is that along ℄ dike
R indicates river side of ℄ dike
L indicates land side of ℄ dike
Classes 8, 10, & 12c indicated in records of bore holes occur in thin alternating bands.

LEGEND

- *Artificial fill*
- *Impervious formation*
- *Pervious formation*
- *Moderately impervious formation*

For general legend, notes and description of soil classes see Plate LVII.

KEY	DATE	REVISION (Indicated by △)	REV. BY	CK. BY	AP. BY

CONNECTICUT RIVER FLOOD CONTROL

CHICOPEE DIKE

SOIL PROFILE - FISCAL YEAR 1940 UNIT

CONNECTICUT & CHICOPEE RIVERS, MASSACHUSETTS

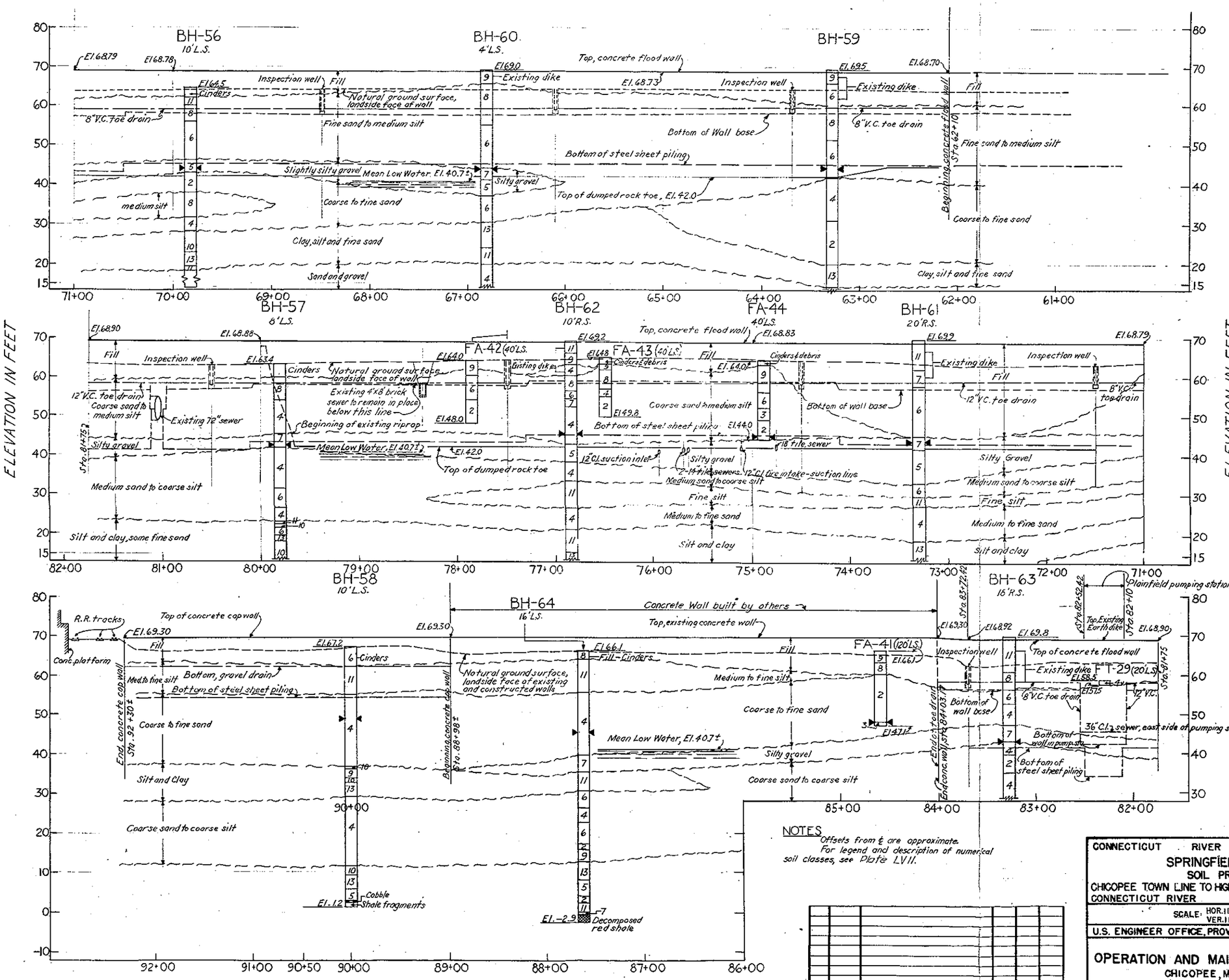
IN SHEETS SCALE: HOR. SCALE: 1 IN. = 40 FT. SHEET NO.
VERT. SCALE: 1 IN. = 10 FT.

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.,

OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS.

PLATE LXII



NOTES

Offsets from ℄ are approximate.
For legend and description of numerical soil classes, see Plate LVII.

KEY	DATE	REVISION (Indicated by △)	REV.BY	CK. BY	AP. BY

CONNECTICUT RIVER FLOOD CONTROL

SPRINGFIELD DIKE

SOIL PROFILE

CHICOPEE TOWN LINE TO HIGH GROUND, CHICOPEE, MASS.

CONNECTICUT RIVER MASSACHUSETTS

SCALE: HOR. 1 IN. = 40 FT.
VER. 1 IN. = 10 FT.

U.S. ENGINEER OFFICE, PROVIDENCE, R.I.

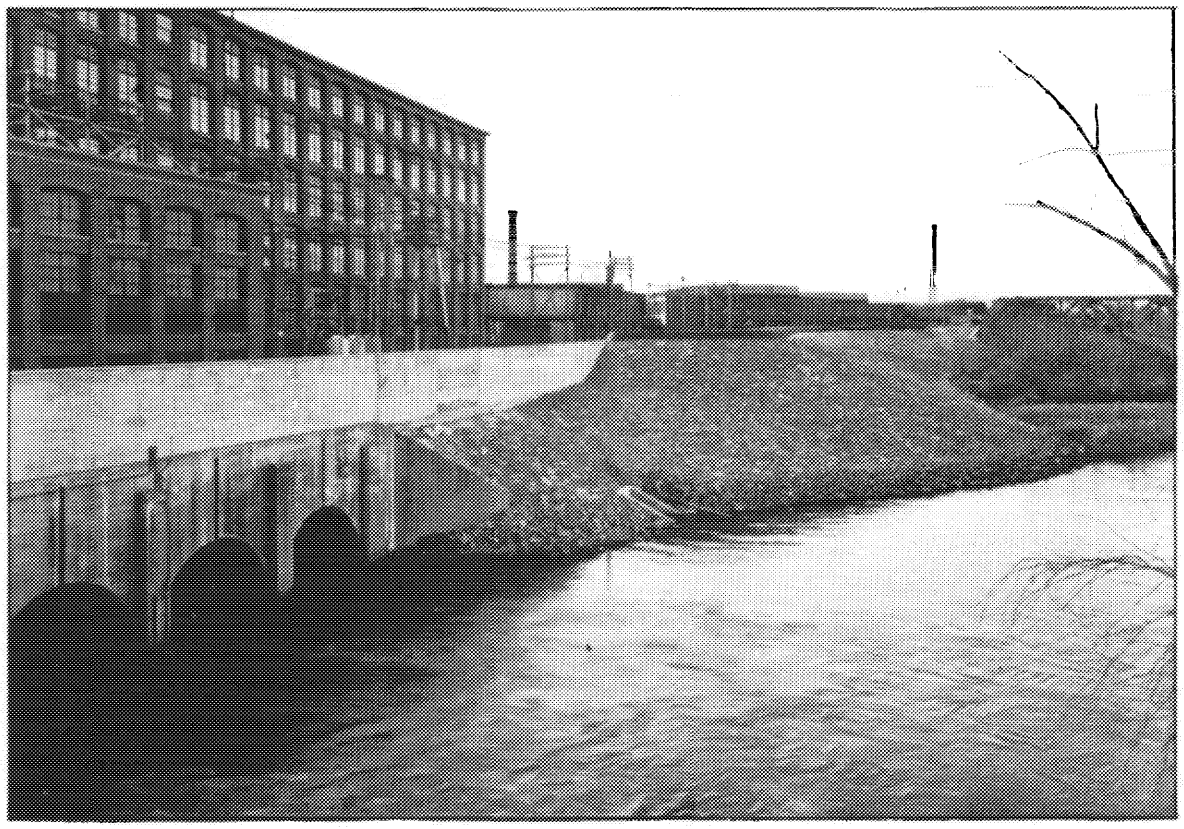
OPERATION AND MAINTENANCE MANUAL

CHICOPEE, MASS.

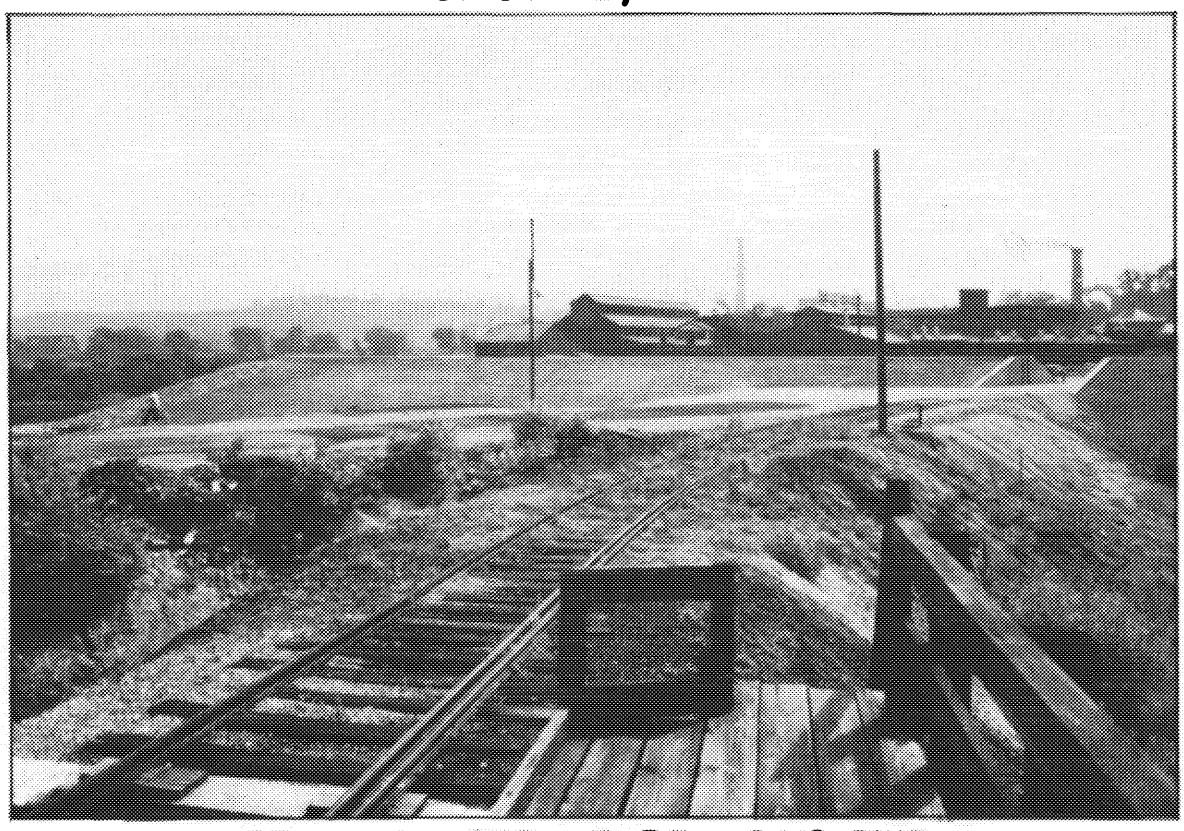
PLATE NO. LXIII

APPENDIX "E"

PHOTOGRAPHS

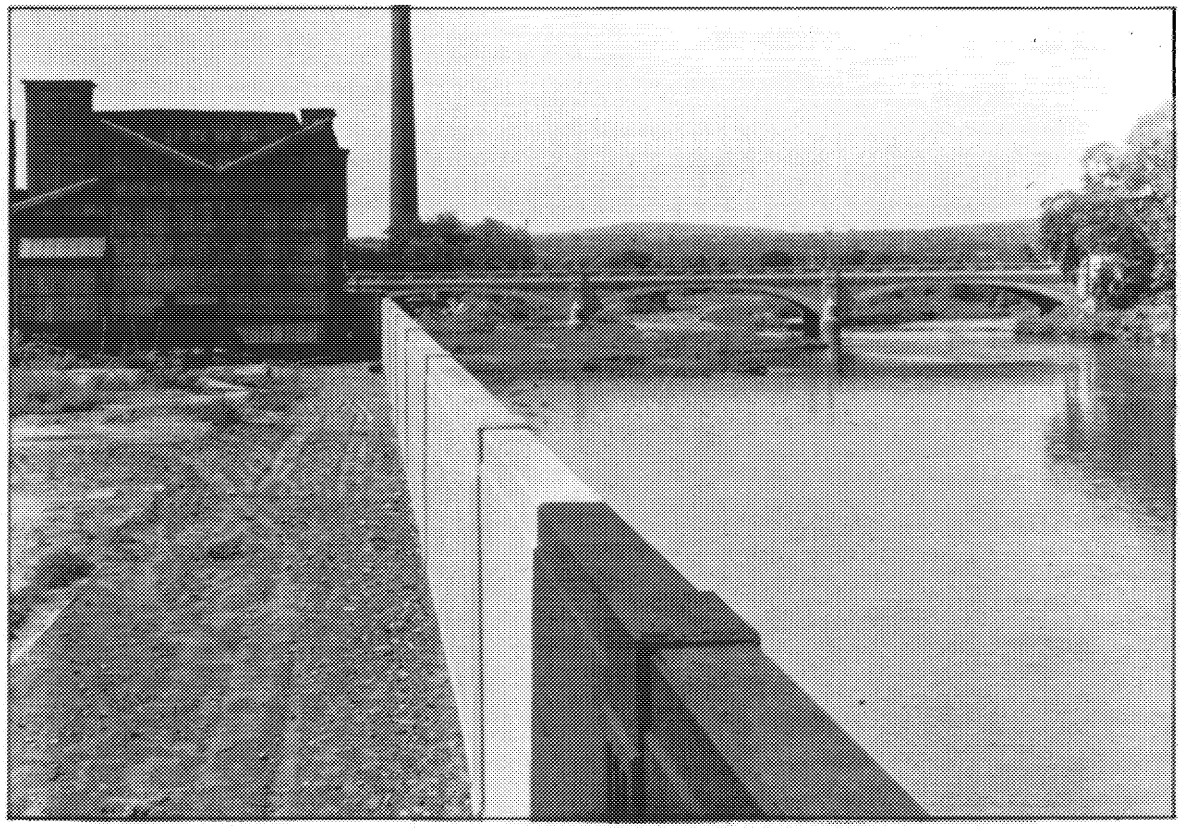


TAILRACE NO. 4, FLOOD WALL & DIKE
CHICOPEE, MASS.

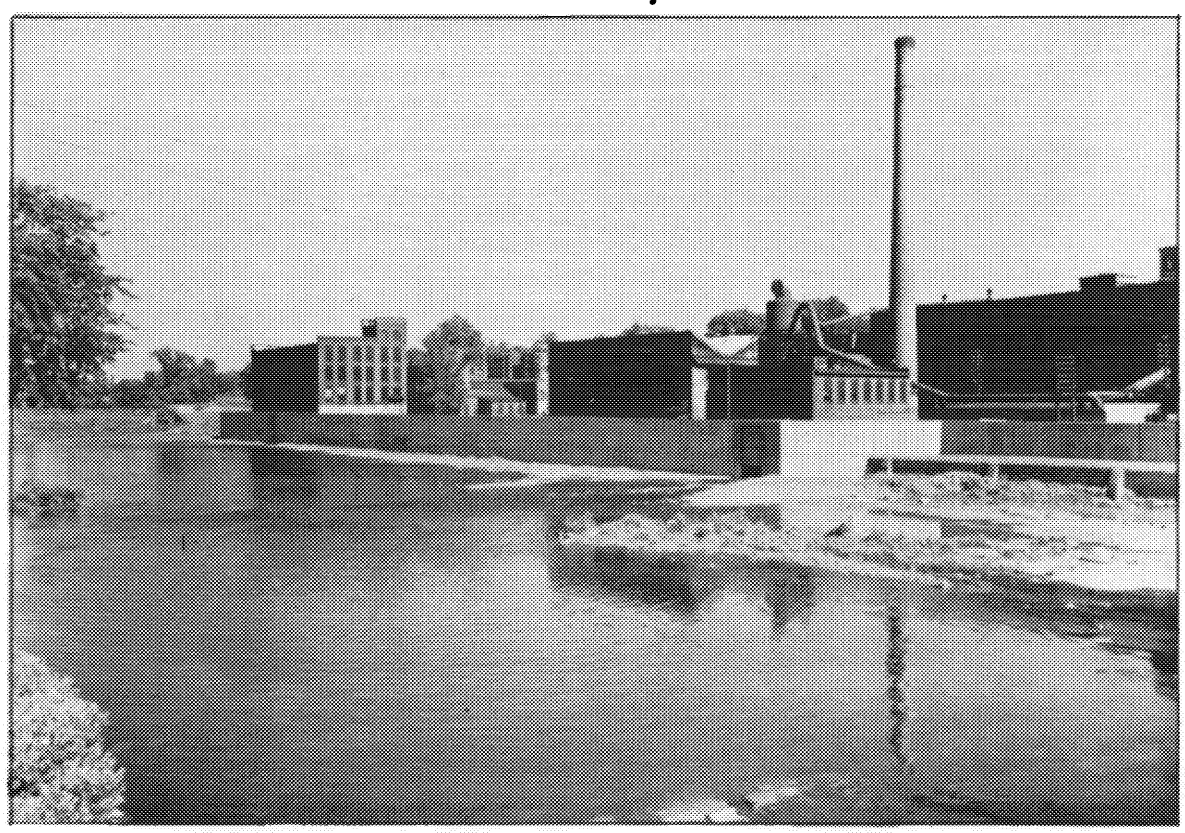


STOP-LOG STRUCTURE NO. 1 & DIKE
CHICOPEE, MASS.

EXHIBIT NO. 1

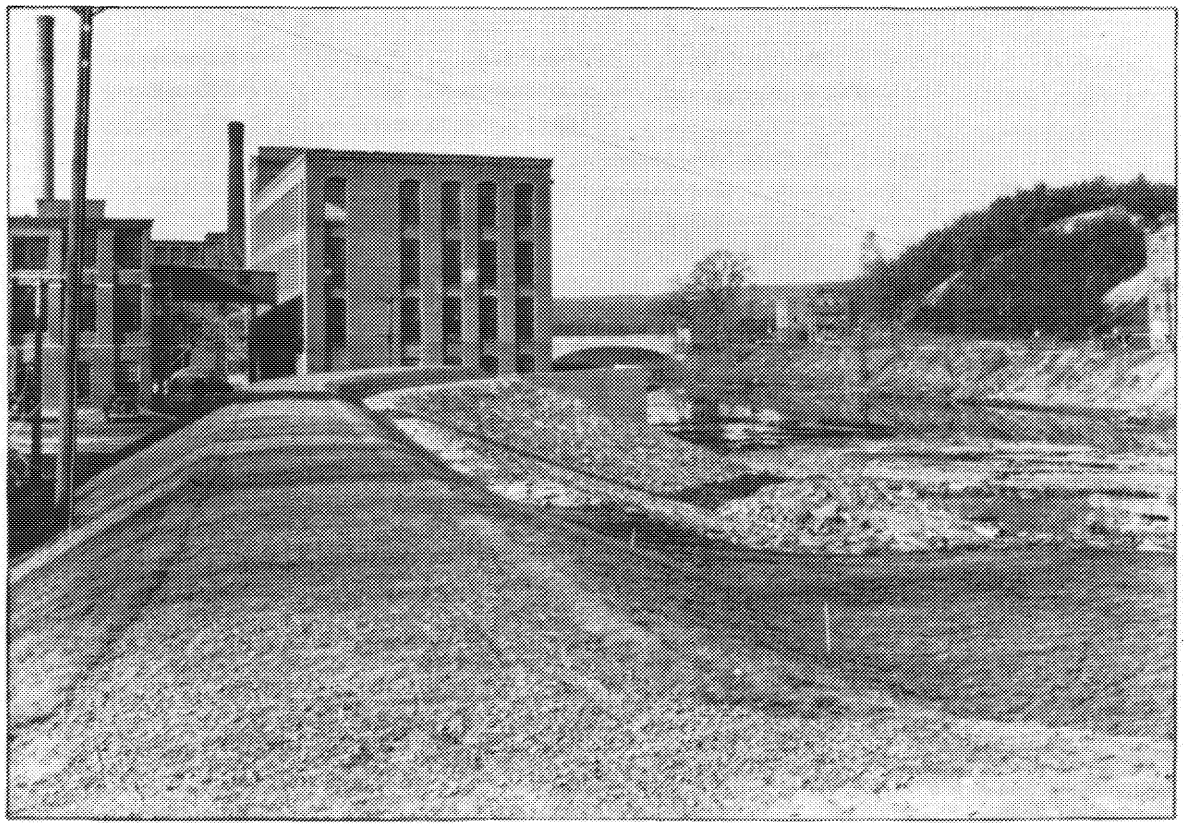


FLOOD WALL ABOVE DAVITT BRIDGE
CHICOPEE, MASS.

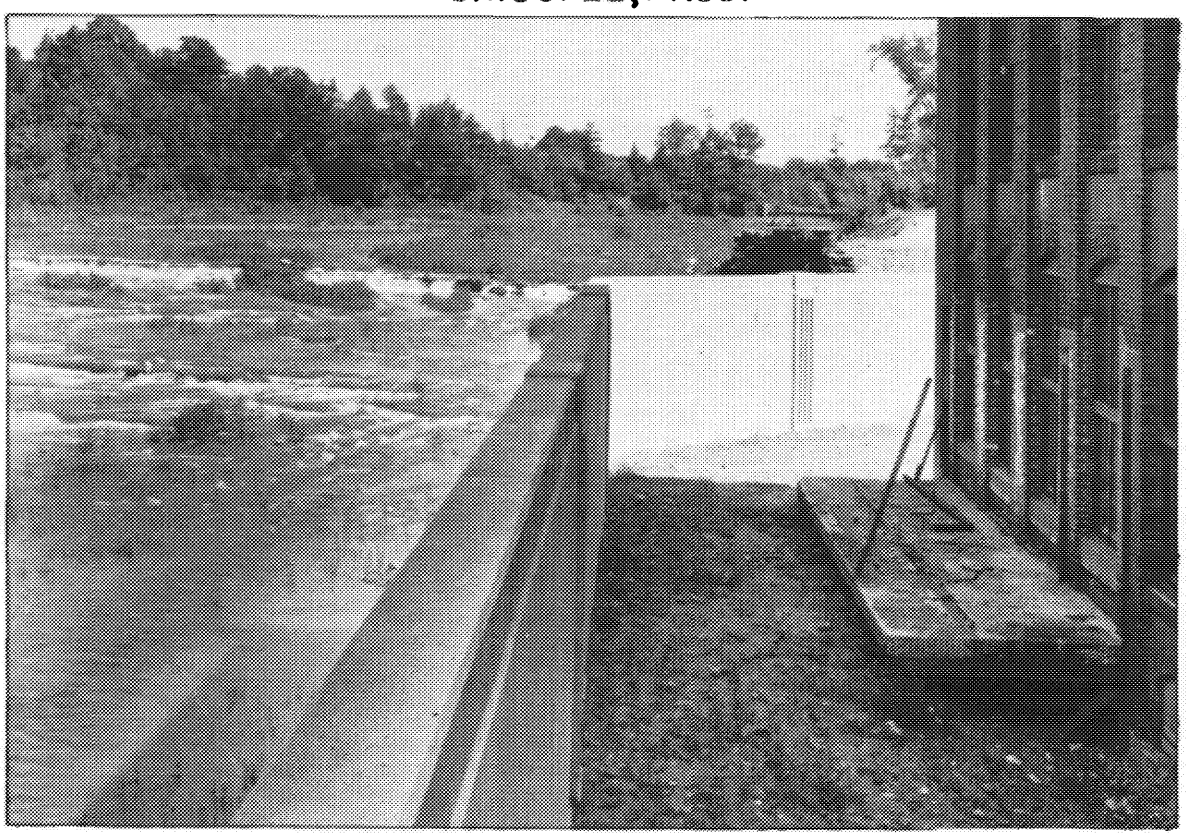


FLOOD WALL SHOWING TAILRACE GATES 1 & 2
CHICOPEE, MASS.

EXHIBIT NO. 2

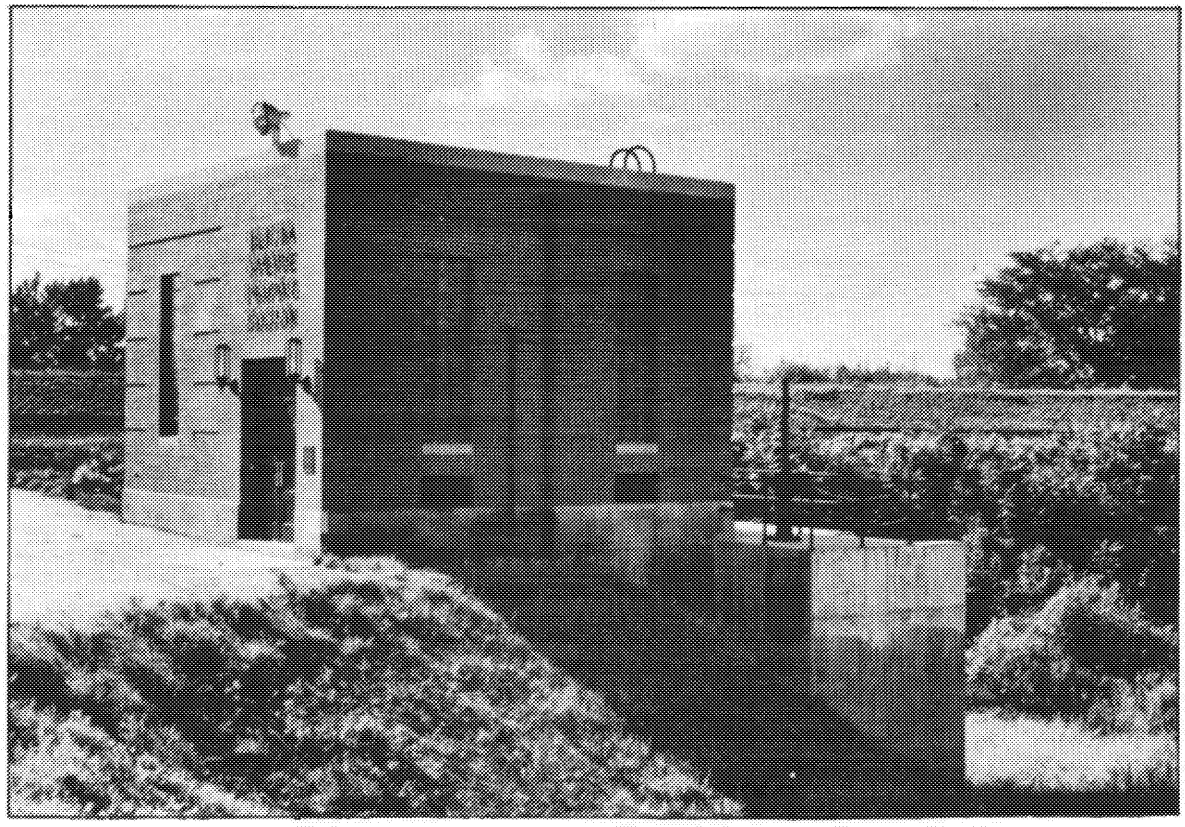


DIKE UPPER END A.G. SPAULDING CO.
CHICOPEE, MASS.



FLOOD WALL UPPER END A.G. SPAULDING CO.
CHICOPEE, MASS.

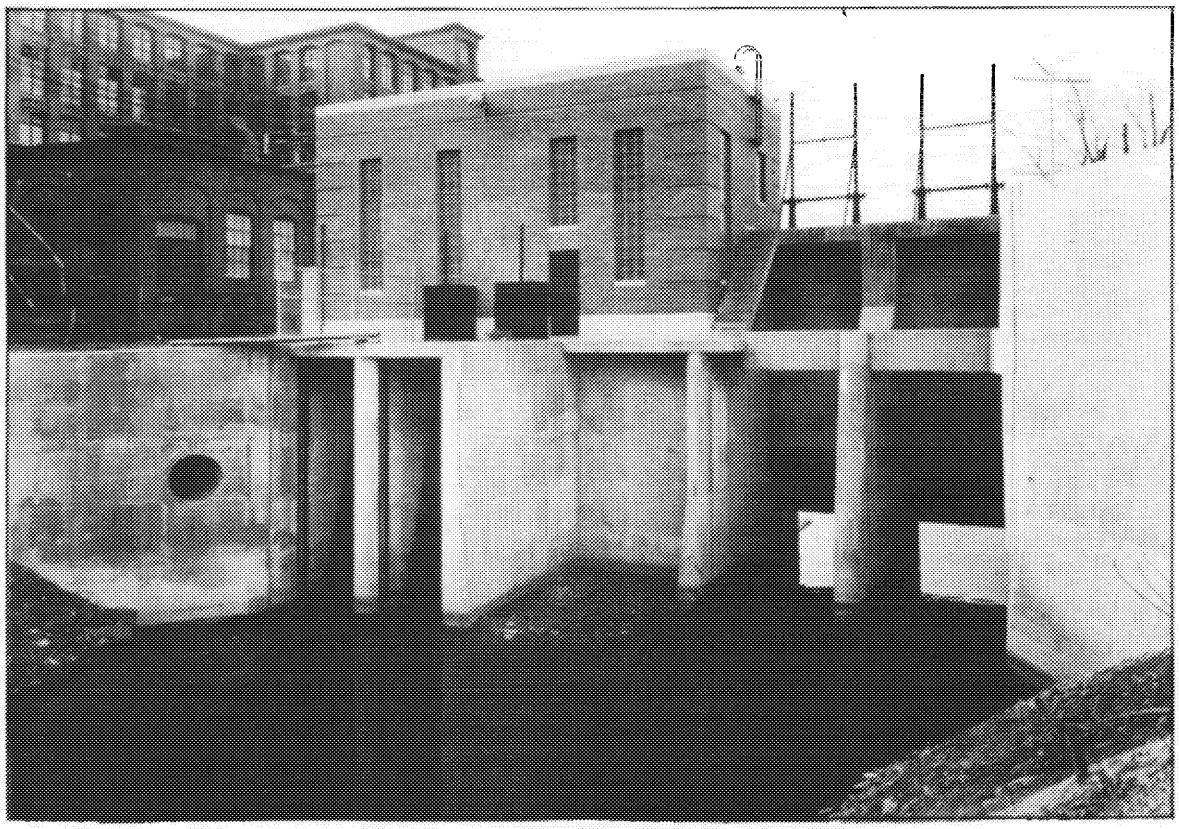
EXHIBIT NO. 3



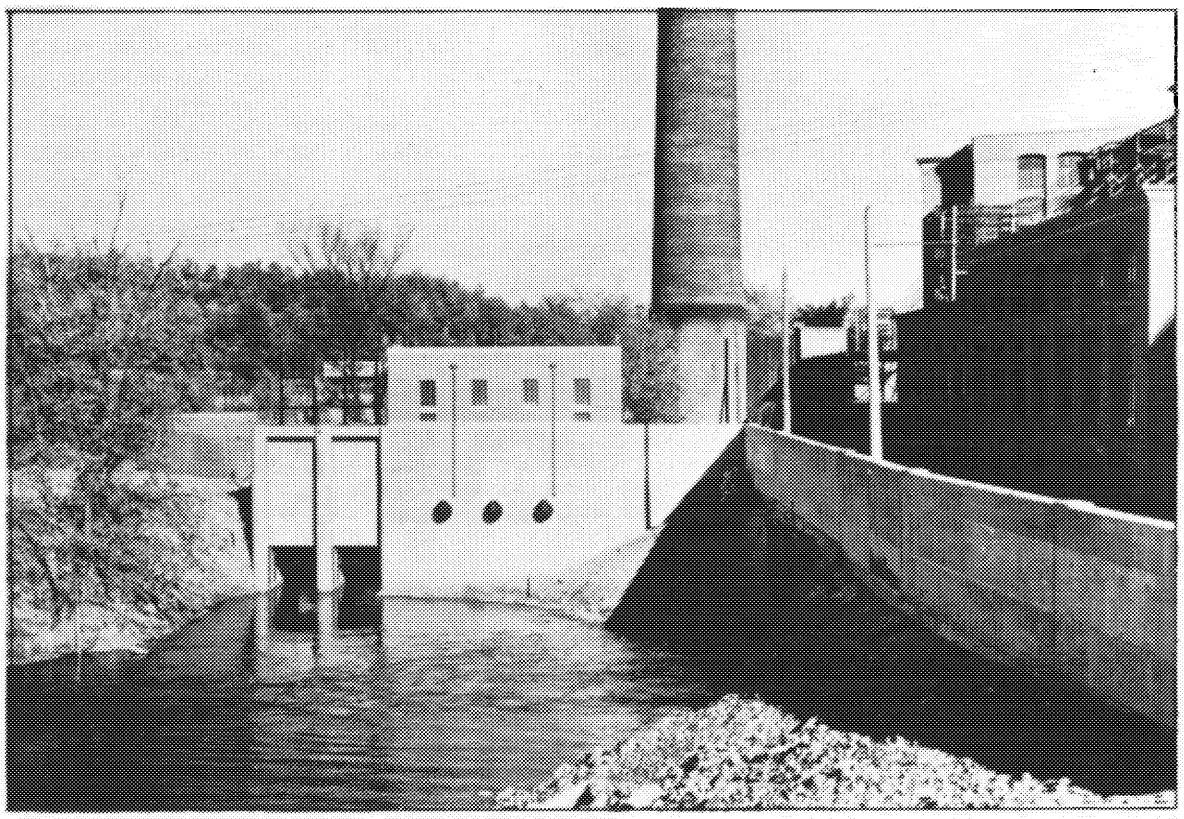
BERTHA AVENUE PUMPING STATION
CHICOPEE, MASS.

CALL STREET PUMPING STATION
CHICOPEE, MASS.

EXHIBIT NO. 4



INTAKE SIDE DWIGHT PUMPING STATION
CHICOPEE, MASS.



OUTLET SIDE OF DWIGHT PUMPING STATION
CHICOPEE, MASS.

EXHIBIT NO. 5